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•DISCOVER THE GIANTS OF THE PREHISTORIC WORLD•

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DINOSAURS! is published by
Orbis Publishing Ltd
Griffin House
161 Hammersmith Rd
London W6 8SD

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N37 93 12.16

Printed in Italy by Officine Grafiche
De Agostini, Novara

EUOPLOCEPHALUS

Hefty *Euoplocephalus* was armed to the tip of its toothless beak with a fascinating variety of plates and studs.

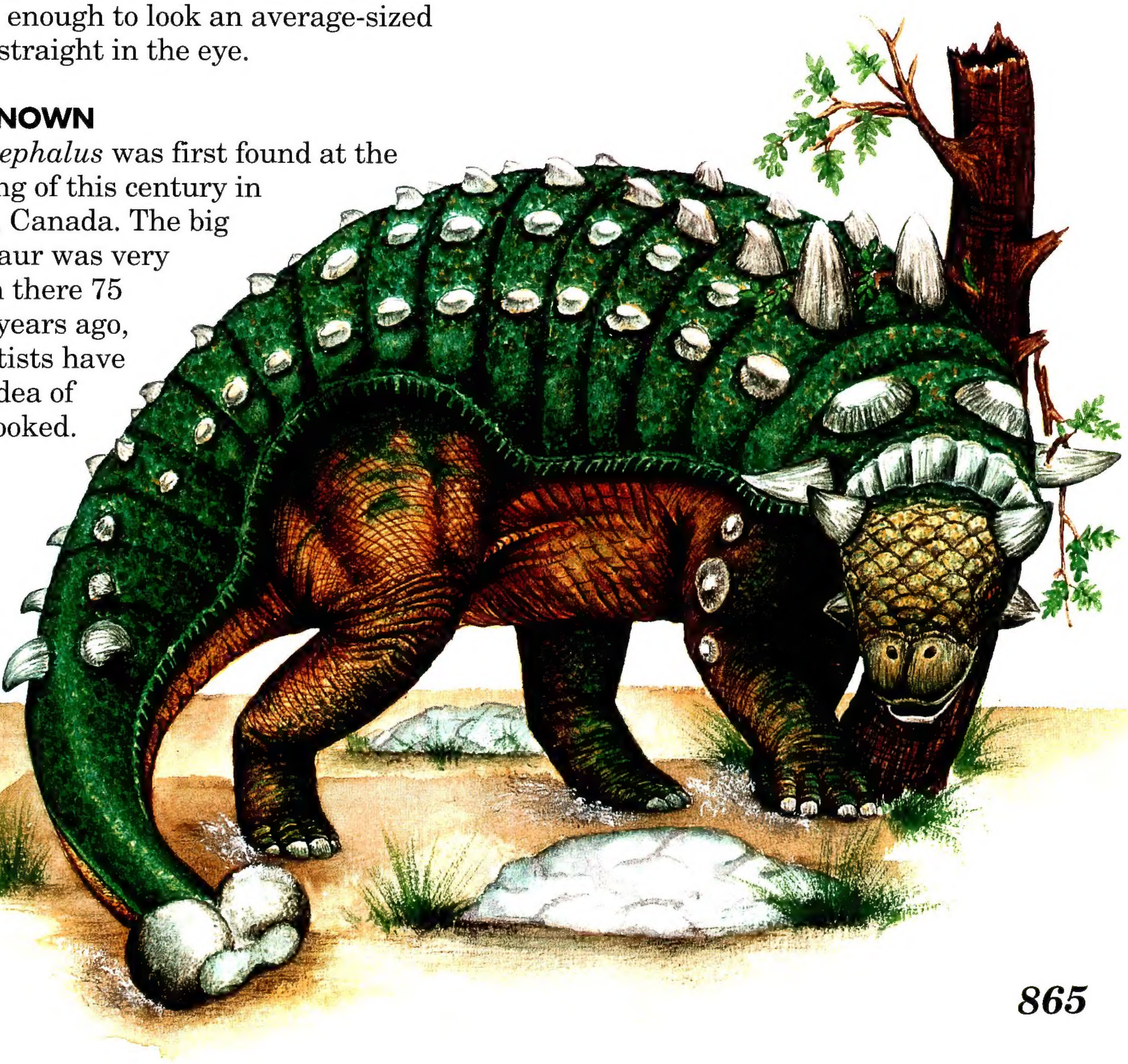
One of the largest of all the armoured dinosaurs, *Euoplocephalus* was as long as an elephant and heavier than a rhinoceros. Standing solidly on four chunky legs, it was tall enough to look an average-sized human straight in the eye.

WELL KNOWN

Euoplocephalus was first found at the beginning of this century in Alberta, Canada. The big ankylosaur was very common there 75 million years ago, so scientists have a good idea of how it looked.

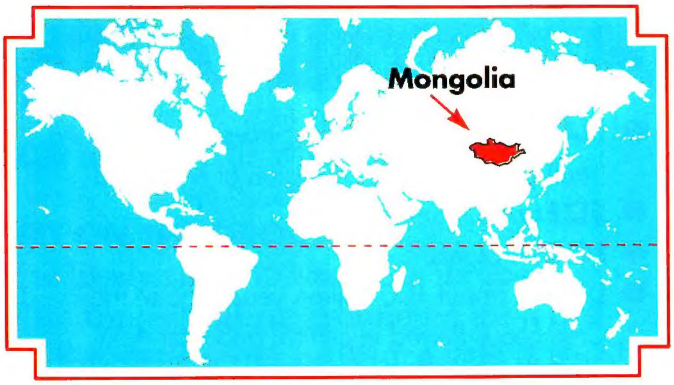
STUDDED SKIN

Euoplocephalus had interesting and very varied armour. All along its back and tail, it was protected by small, bony studs sunk into its skin. Much larger armour plates were arranged in bands across its body in a variety of different patterns. Some were disc-shaped and blunt. Others were spiked and stood in rows, which gradually became smaller towards the tail.



Dinosaurs from Mongolia

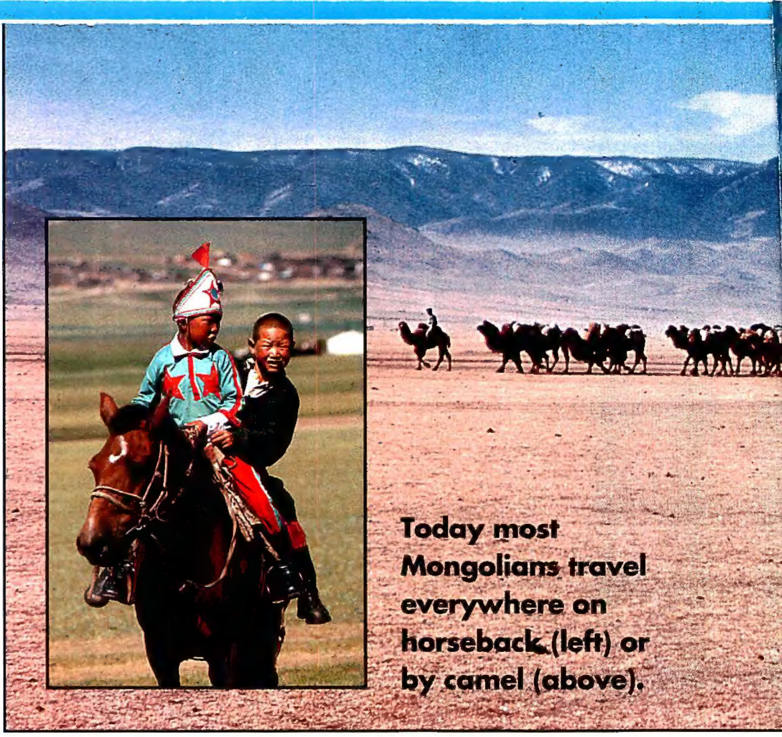
Many famous dinosaurs have been found in Mongolia, including the terrible tyrannosaur *Tarbosaurus,* and the egg-eater *Oviraptor.*



Mongolia is a large country in eastern Asia, between Russia and China. Here there are snowy mountains, grassy plains and the immense Gobi Desert. The hot summers and icy winters are ideal weather for wearing away rocks, to expose fossils.

LOADS OF FOSSILS

Many Mongolian rocks were formed late in the Age of the Dinosaurs. They have thousands of fossils, which poke out of the bare, stony surface.



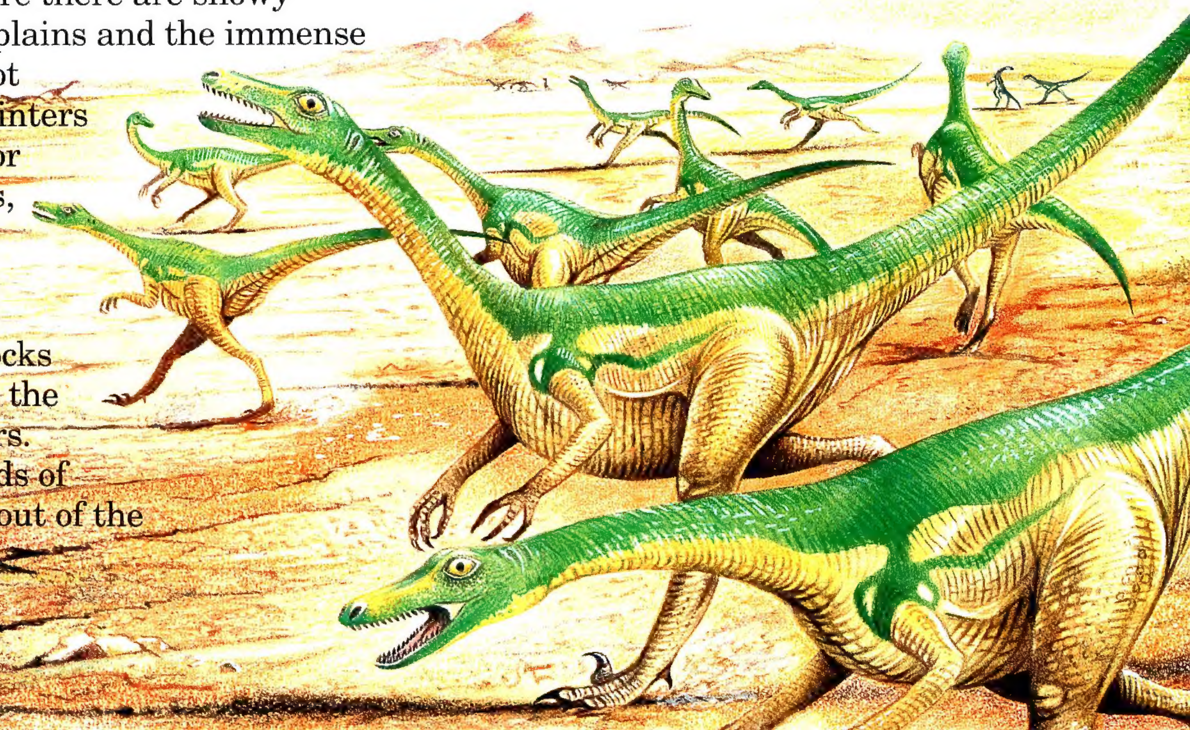
Today most Mongolians travel everywhere on horseback (left) or by camel (above).

THE AMERICAN CONNECTION

When the continents moved their positions many millions of years ago, Asia was cut off from Europe and Africa. But it was joined to North America, across the Arctic Circle. So Mongolian dinosaurs were similar to their American cousins, and different from European ones.

MONGOLIAN COUSIN

Tarbosaurus, meaning 'alarming reptile' was as terrifying as the famous American *T rex*. In fact, the two were almost the same, but *Tarbosaurus* was about 1m shorter. It had a powerful head and neck to jerk and shake the life out of its victims.



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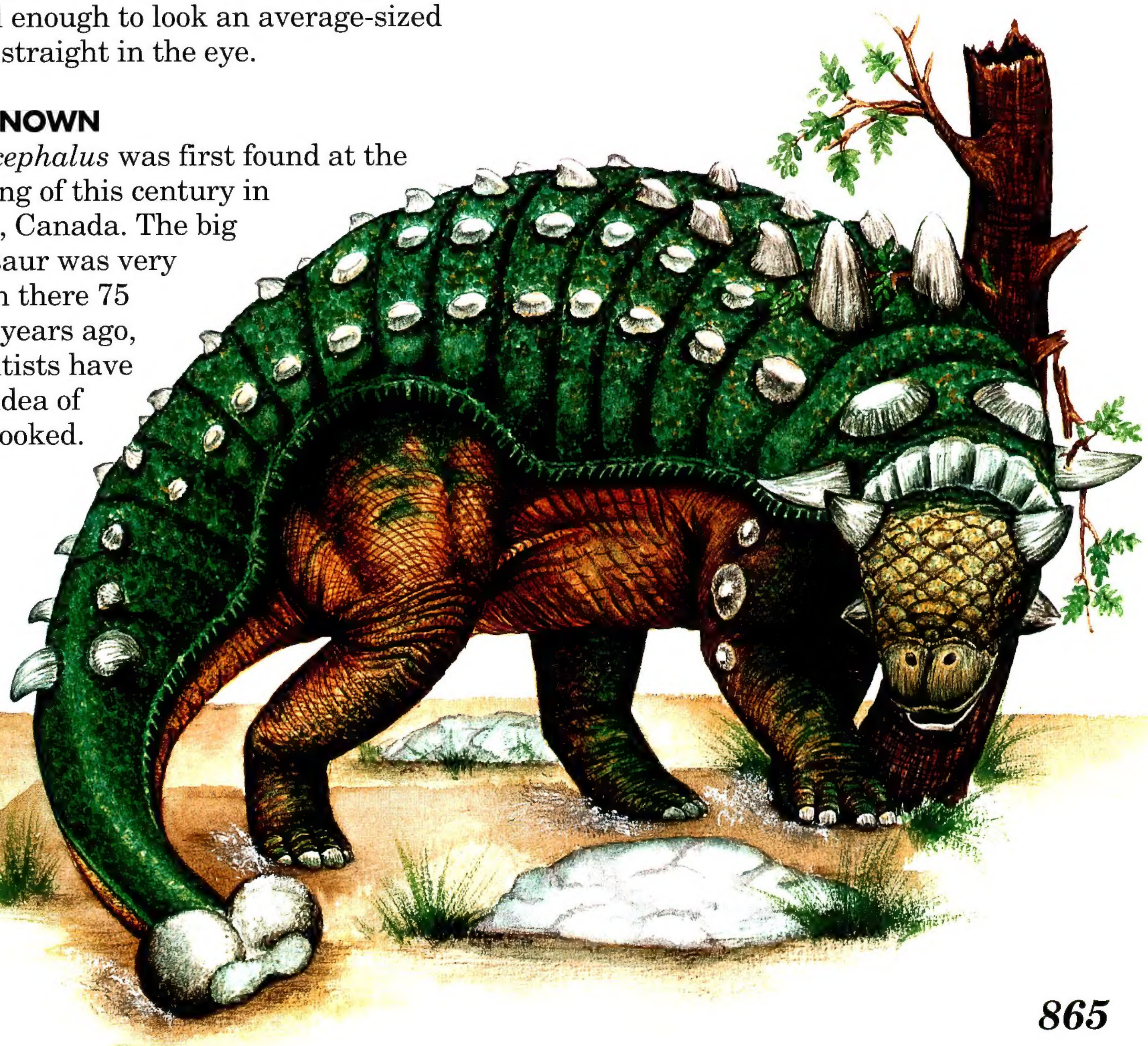
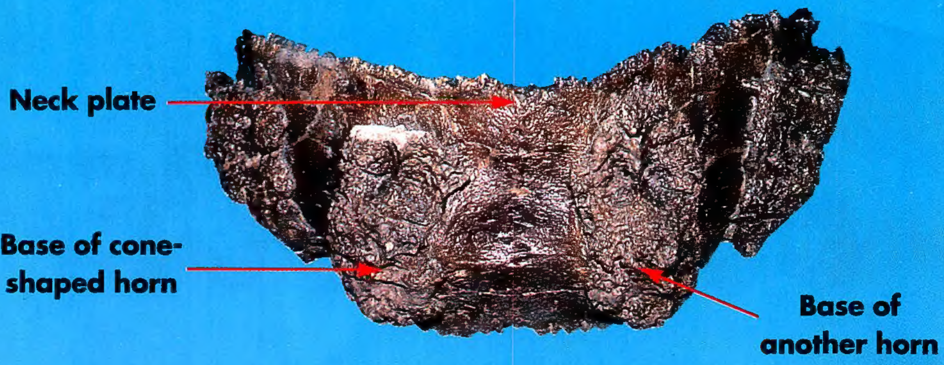
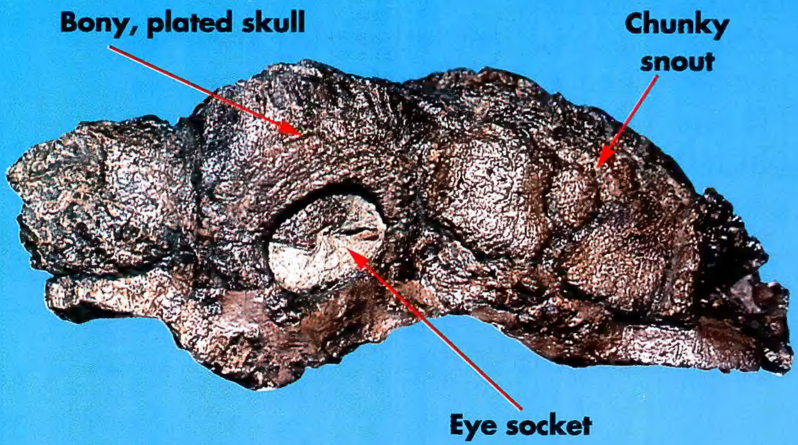


***Euoplocephalus'* neck was well protected by a bony plate (right).**

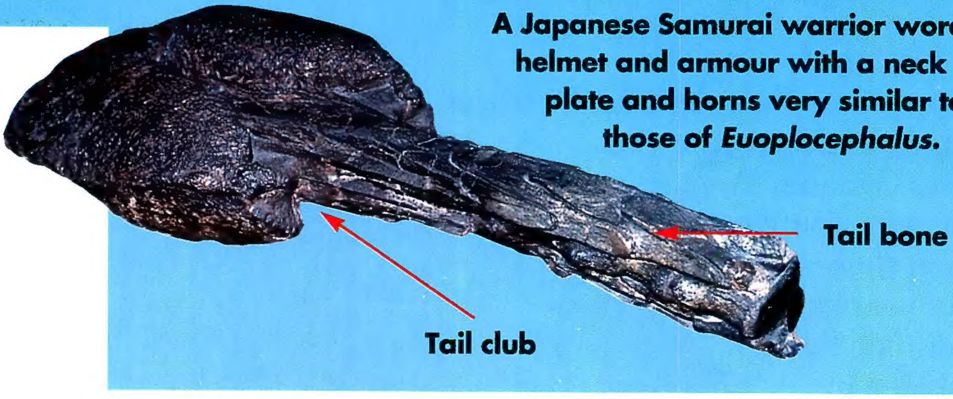




A Japanese Samurai warrior wore a helmet and armour with a neck plate and horns very similar to those of *Euoplocephalus.*

***Euoplocephalus* has the boniest skull of all the dinosaurs (above).**

Two fused bones turned *Euoplocephalus'* tail into a deadly weapon – a tail club (right).



A WALKING FORTRESS

Euoplocephalus had the best protected skull of almost any dinosaur. It was totally covered by slabs of bone and had two large, cone-shaped horns. Its skull was so strong that, to its prey, *Euoplocephalus* must have looked like a walking fortress.

STEEL SHUTTERS

If *Euoplocephalus'* face was attacked by a predator it used another amazing defence. Its eye sockets had curved bony plates which snapped down like the steel shutters on a shop window. So far it is the only dinosaur known to have such protection.

Is it true that all the ankylosaurids lived only in the Cretaceous Period?

So far the fossils of ankylosaurids such as *Euoplocephalus* have only been found in rocks that date from the Cretaceous Period. Scientists see this as evidence that they lived only in the Cretaceous, otherwise their fossils would be found in rocks from the Triassic and Jurassic too.

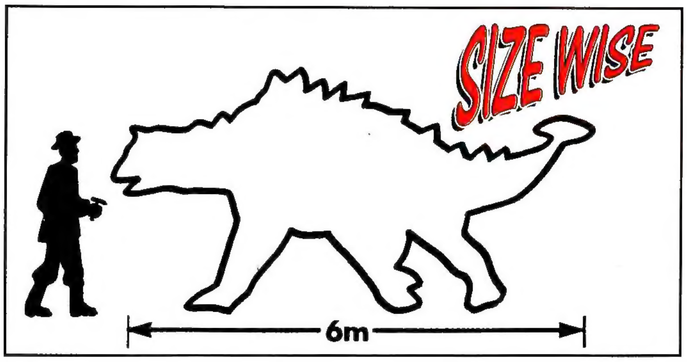
Ankylosaurids also appear to have lived in very few places. The only parts of the world where their fossils have been found so far are western North America and Mongolia.

SURPRISE SPEED

Have you noticed how nimbly a rhinoceros moves in spite of its size and weight? *Euoplocephalus* was also heavily built. It probably weighed about 2 tonnes. But just like the rhino it was also quite light on its feet because its heavy body was supported by extremely strong leg muscles. So, instead of creeping around like an overgrown tortoise, it was able to move quite quickly when necessary.

TAIL END

Euoplocephalus was well protected at both ends of its armoured body. At the tip of its tapering tail it had a heavy club as solid as a boulder of rock. *Euoplocephalus* could swing its tail freely from side to side, because powerful muscles supported its weight. One deadly swipe with this fearsome tail could topple even the largest tyrannosaur. When *Euoplocephalus* was threatened, it crouched. An attacker had no chance, unless it flipped the dinosaur on to its back; an almost impossible task!



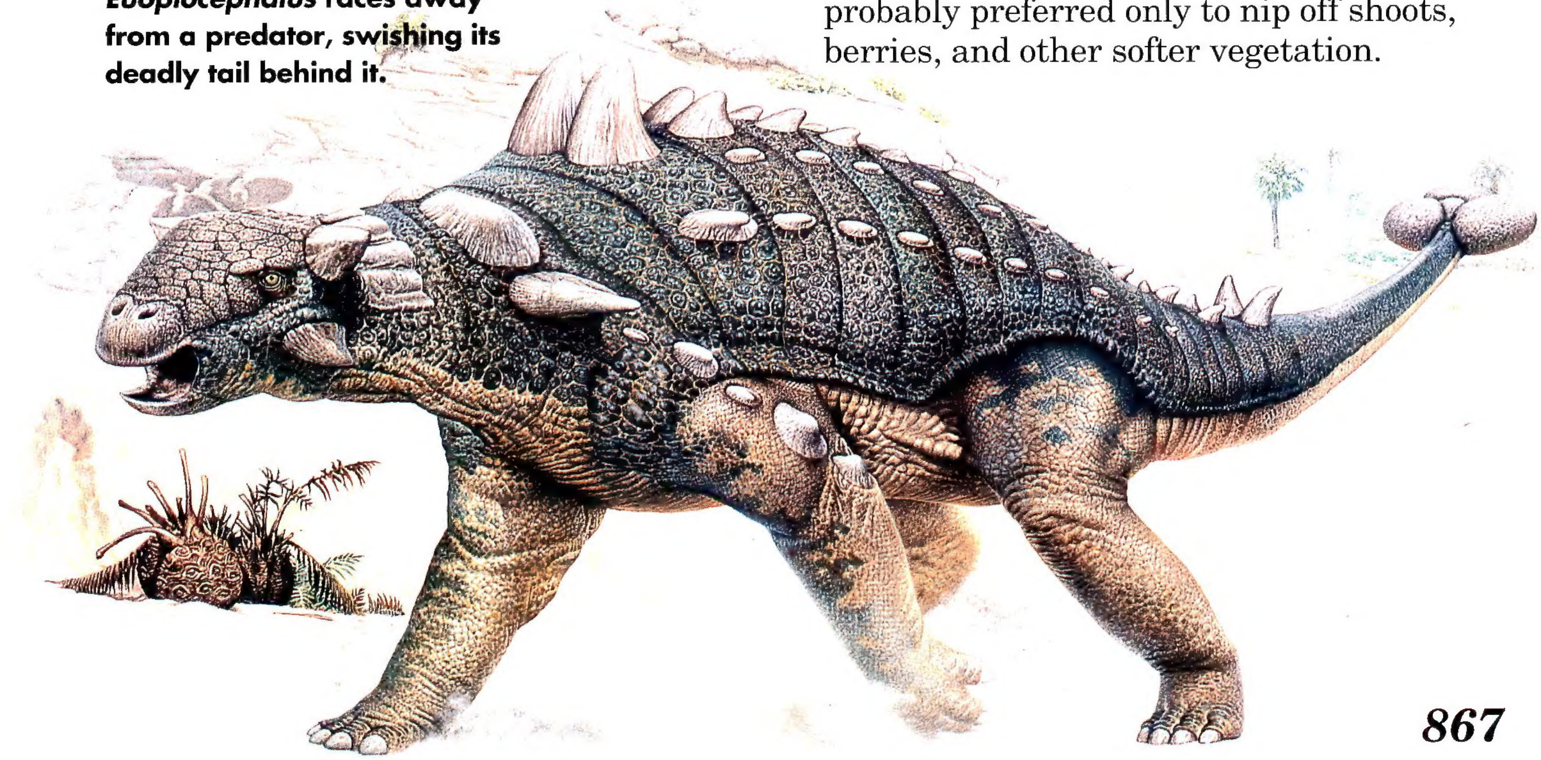
MONSTER FACTS

- **NAME:** *Euoplocephalus* (yoo-o-plo-sef-al-us) means 'well-armoured head'
- **SIZE:** about 6m long
- **FOOD:** plants
- **LIVED:** about 75 million years ago in the Late Cretaceous in North America and Mongolia

EASY EATING

Not surprisingly, *Euoplocephalus* was generally left alone to browse peacefully among low-growing plants. Unlike the rest of this dinosaur's body, its teeth were very feeble. Its curved toothless beak was not nearly so strong as *Triceratops'*, so it probably preferred only to nip off shoots, berries, and other softer vegetation.

Like an armoured tank, *Euoplocephalus* races away from a predator, swishing its deadly tail behind it.



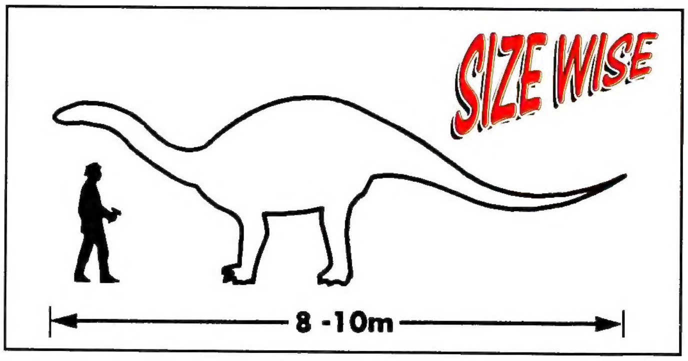
BLIKANASAURUS

Bulky *Blikanasaurus* was about as long as an elephant and ambled about on four legs.

Only the big footprints of this mysterious dinosaur have been found. Some experts think that it may be the same dinosaur as *Euskelosaurus*, a prosauropod that also lived in South Africa. Prosauropods munched their way through the plants of every continent except Antarctica. *Blikanasaurus* was probably one of the least agile of this widespread family.

FEET ON THE GROUND

It is likely that *Blikanasaurus* spent most of its time strolling around on all fours. Unlike some other prosauropods it was too heavy to rear up on its back legs to reach high branches. When *Blikanasaurus* was alive the climate may have been cool and probably wet. This made life more comfortable for large dinosaurs like *Blikanasaurus*.

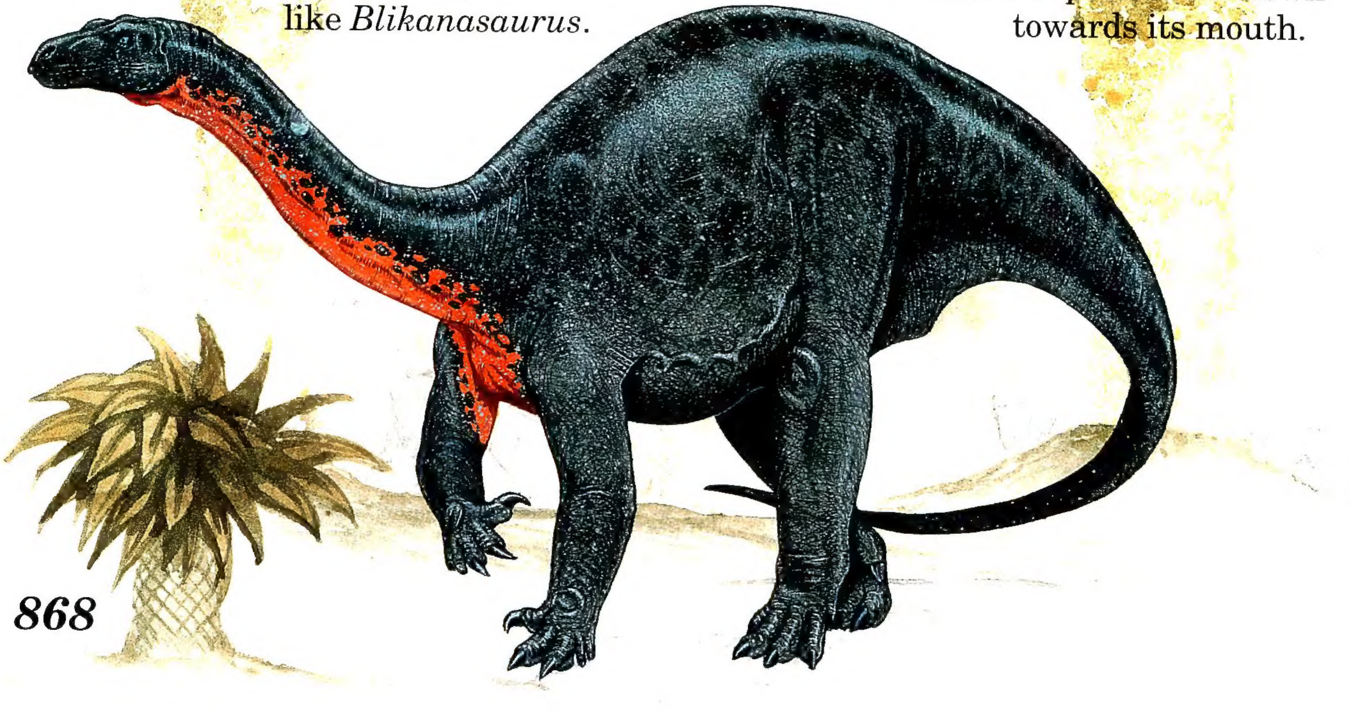


MONSTER FACTS

- **NAME:** *Blikanasaurus* (blik-arn-a-saw-rus), named after Blikana Mountain
- **SIZE:** about 8 -10m long
- **FOOD:** plants
- **LIVED:** about 220 million years ago in the Late Triassic, in Cape Province, South Africa

CURVED CLAWS

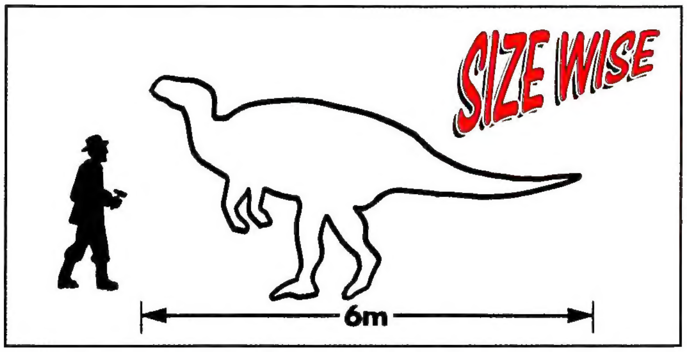
When it was feeding in the Triassic forests *Blikanasaurus* used its huge hook-like claws to pull leaves down towards its mouth.



BACTROSAURUS

Flat-headed *Bactrosaurus* was one of the earliest duckbilled dinosaurs.

Bactrosaurus was quite small compared with other hadrosaurs. It was about as long as two rhinoceroses and stood well above the head height of an adult human.



MONSTER FACTS

- **NAME:** *Bactrosaurus* (bac-tro-saw-rus) means 'reptile from Bactria', a region of Mongolia
- **SIZE:** about 6m long
- **FOOD:** plants
- **LIVED:** about 100 million years ago in the Cretaceous Period in central and east Asia

LOOK, NO HANDS!

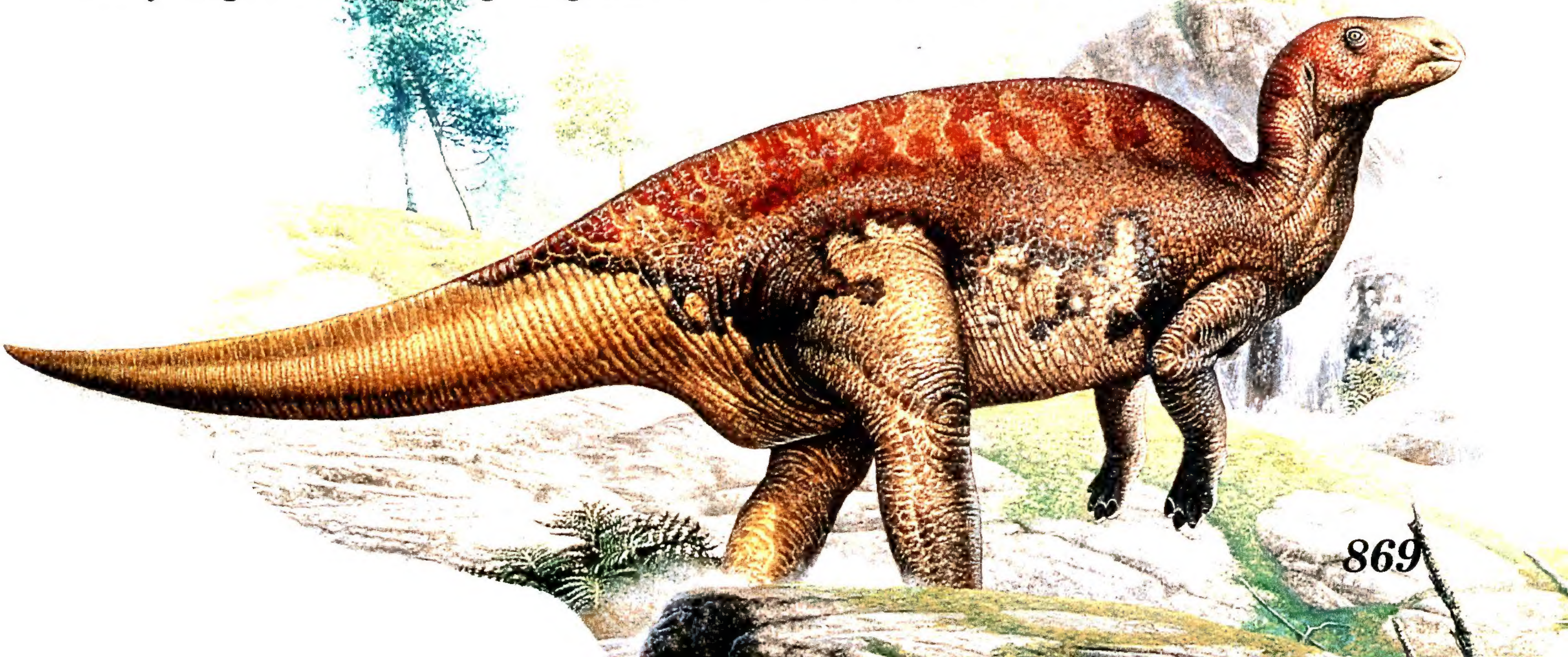
In many ways *Bactrosaurus* looked like an iguanodontid (the plant-eating dinosaur family). When it was discovered its hands were missing so experts cannot be certain if it had four fingers like hadrosaurs or a thumb spike like *Iguanodon*.

GRINDING MACHINE

These duckbilled dinosaurs did not live on soft water plants as ducks do today. Behind their beaks they had hundreds of teeth which made a grinding surface like a carpenter's file. With it *Bactrosaurus* could crush its food and munch on the toughest woody twigs without getting indigestion.

FLAT HEAD

Bactrosaurus did not have a crest of any sort. It did not even have a bump on its head like *Kritosaurus*. Instead it had a low flat head above its curved, toothless snout.



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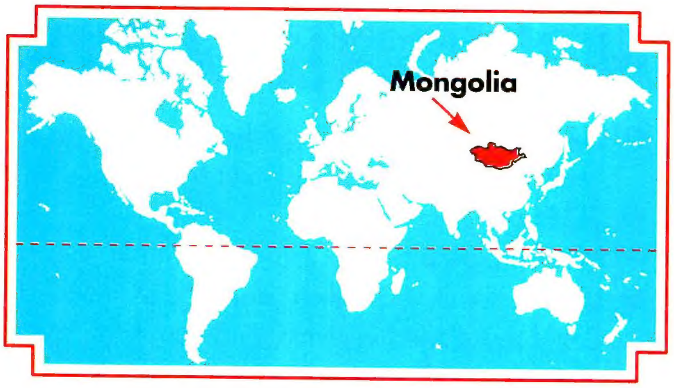

Mongolia is a large country in eastern Asia, between Russia and China. Here there are snowy mountains, grassy plains and the immense Gobi Desert. The hot summers and icy winters are ideal weather for wearing away rocks, to expose fossils.

LOADS OF FOSSILS

Many Mongolian rocks were formed late in the Age of the Dinosaurs. They have thousands of fossils, which poke out of the bare, stony surface.

Today most Mongolians travel everywhere on horseback (left) or by camel (above).

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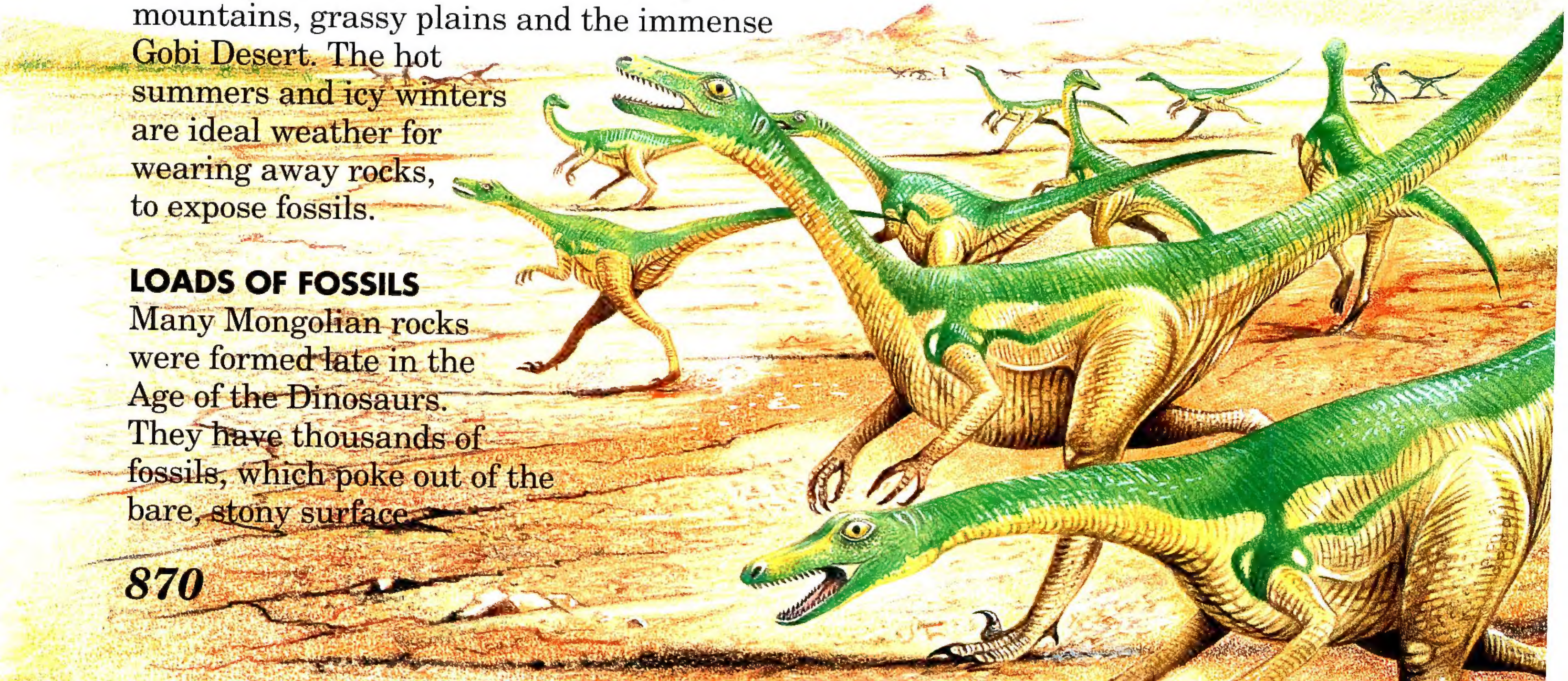
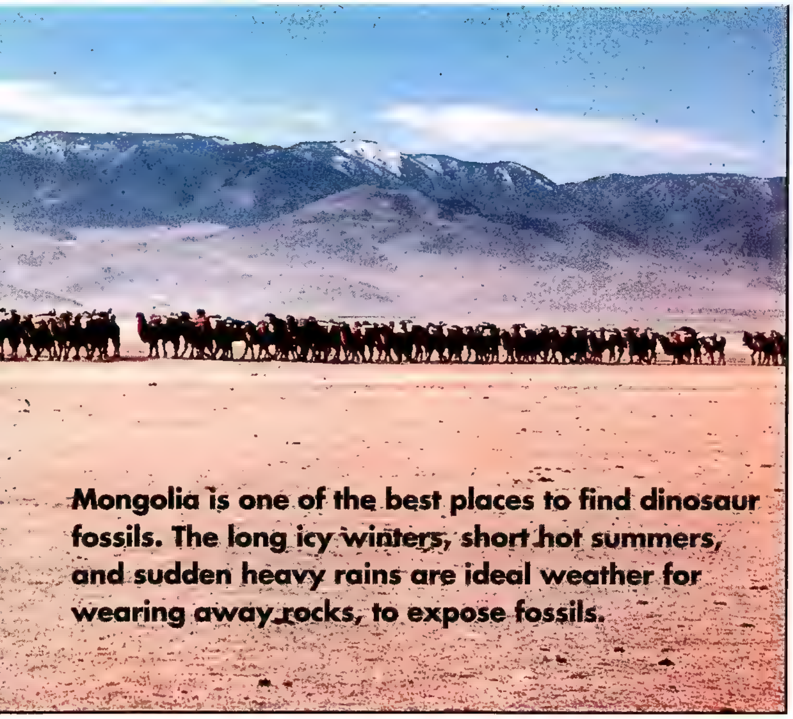




Mongolia is one of the best places to find dinosaur fossils. The long icy winters, short hot summers, and sudden heavy rains are ideal weather for wearing away rocks, to expose fossils.

SPEEDY PREDATOR

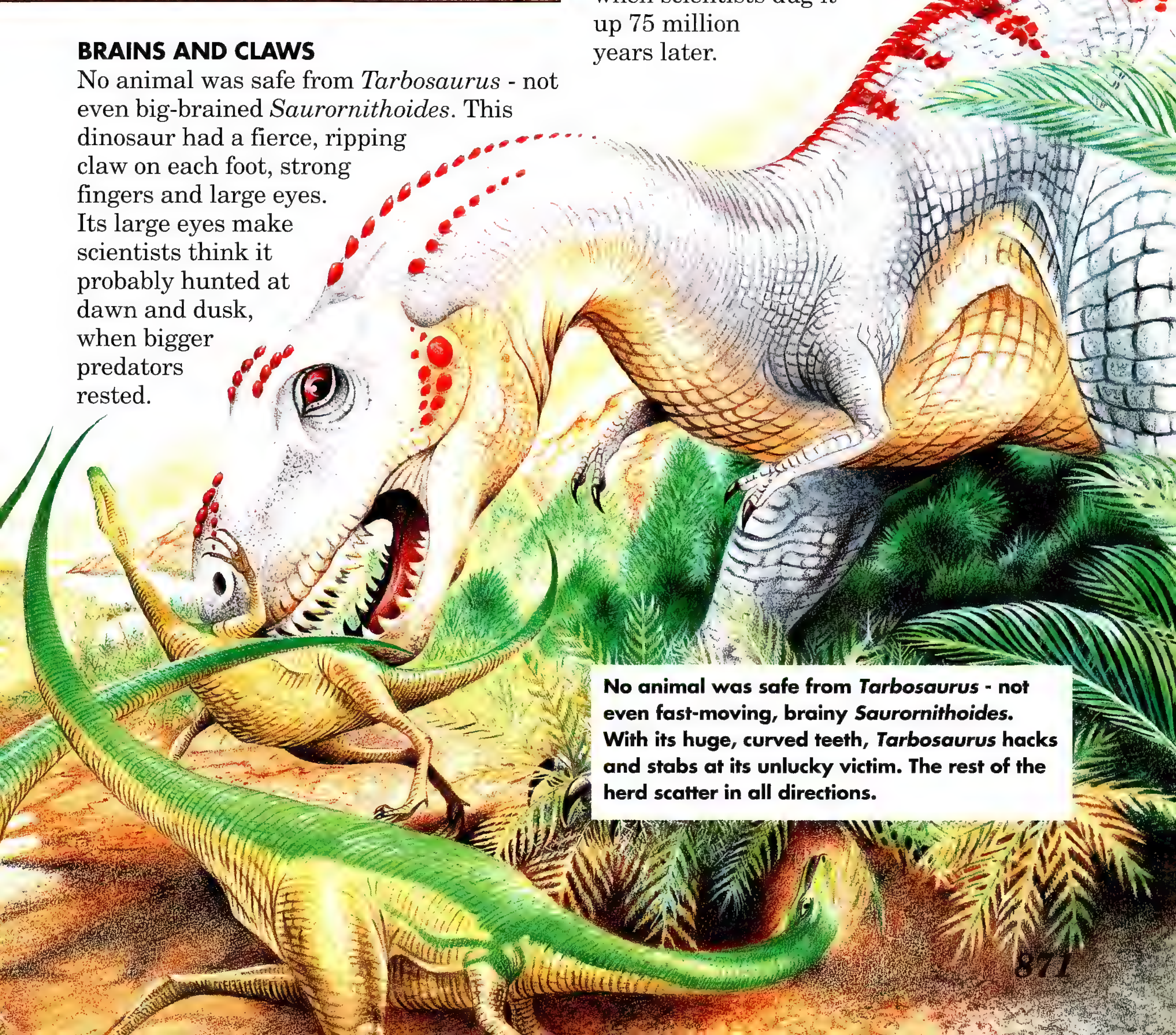
Another small but fierce hunter from Mongolia was the 'speedy predator' *Velociraptor*. It was rather like its American relatives *Deinonychus* and *Dromaeosaurus*, with one foot claw reserved for slashing and ripping.

LONG LUNCH

One Mongolian *Velociraptor* fossil was found still clutching the head of its lunch, *Protoceratops*, when scientists dug it up 75 million years later.

BRAINS AND CLAWS

No animal was safe from *Tarbosaurus* - not even big-brained *Saurornithoides*. This dinosaur had a fierce, ripping claw on each foot, strong fingers and large eyes. Its large eyes make scientists think it probably hunted at dawn and dusk, when bigger predators rested.



No animal was safe from *Tarbosaurus* - not even fast-moving, brainy *Saurornithoides*. With its huge, curved teeth, *Tarbosaurus* hacks and stabs at its unlucky victim. The rest of the herd scatter in all directions.

OSTRICH TYPE

Several slim, two-legged, ostrich-type dinosaurs lived in Mongolia. *Deinocheirus*, 'terrible hand', was a giant. Only its arm bones have been found, but they measure 2.5m long. The whole animal may have been as tall as a giraffe – a terrifying sight.

RAPID RUNNERS

Gallimimus was a smaller ostrich-type, but it was probably one of the speediest dinosaurs, running at over 55km/h. *Oviraptor*, 'the egg-thief' was only 2m long, and as tall as a 12-year-old child. Its strong beak probably cracked dinosaur eggs.

THE RAINS ON THE PLAINS

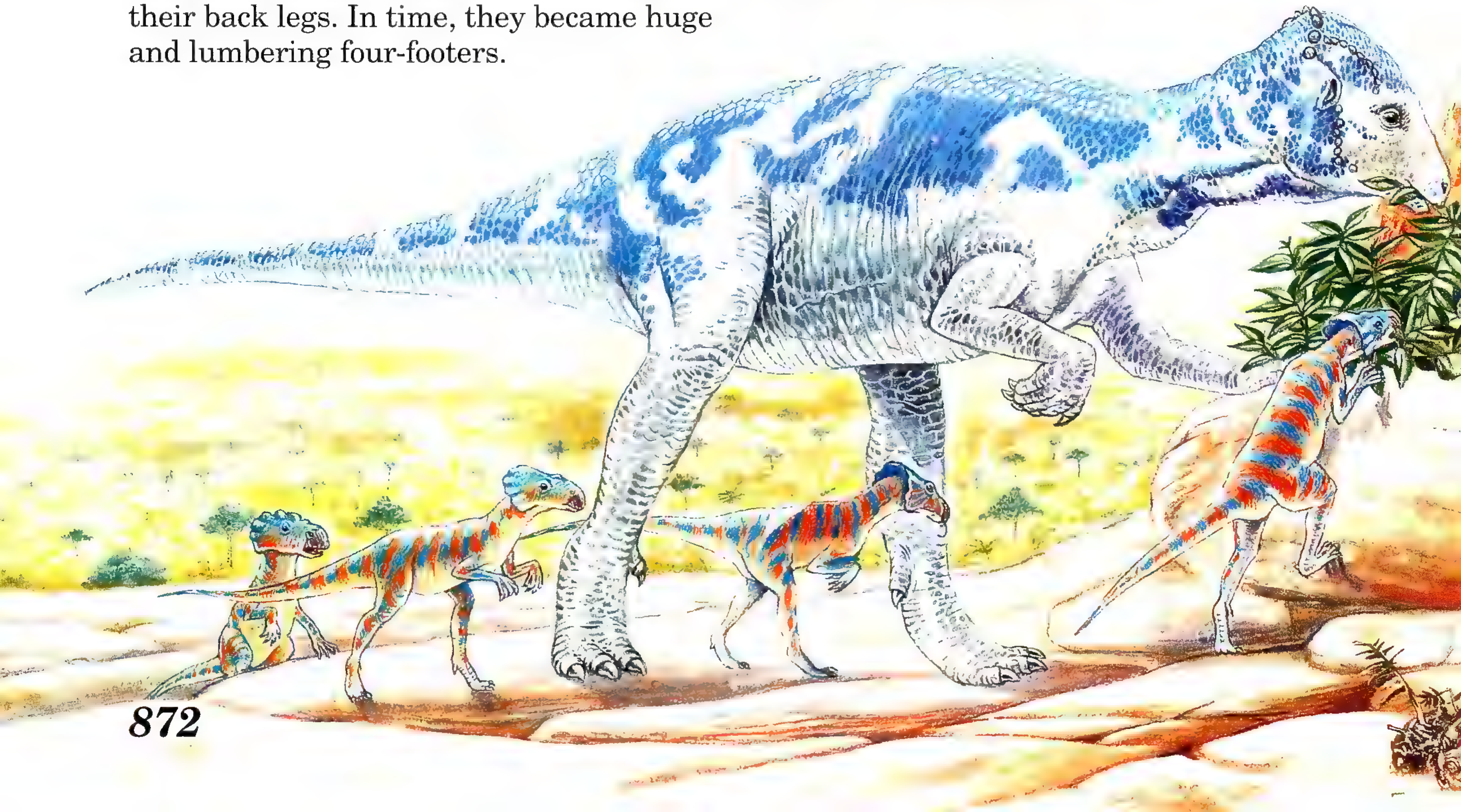
When the rains flooded the plains of Cretaceous Mongolia, plants grew thick and lush. They were plentiful food for herbivorous dinosaurs. On these plains, about 90 million years ago, grazed the psittacosaurs and protoceratopians. The protoceratopians were forerunners of ceratopians like American *Triceratops*. They were small at first, and could run on their back legs. In time, they became huge and lumbering four-footers.

Is it true that Mongolian dinosaurs are only from the Cretaceous Period?

Yes. All the dinosaurs found in Mongolia date back to Cretaceous times. During the Triassic, Mongolia was made up of tundra (cold, treeless regions). There were no shallow seas and few rivers to form sedimentary rocks, so there are no fossils. In the Jurassic, parts of Mongolia were desert. Small areas of sedimentary rocks formed. But it seems that no dinosaurs lived there. No fossils have been found. Conditions for dinosaurs and fossilization were much better in the Cretaceous.

BEAKS AND HORNED FACES

Psittacosaurus was one of the first Mongolian protoceratopians. It was named 'parrot reptile' because of its horny beak. Another, but much smaller member of the family was *Microceratops*, which means 'tiny-horned face'. Then there was *Protoceratops*, the 'first horned-face', a dinosaur about the size of a pig, with a neck frill but no horns.



THICKO-DINOS

Several bone-head dinosaurs lived in Mongolia about 80 MYA. One of these was *Homalocephale*. It had small bony knobs on the thickened dome of its skull. It may have butted rivals for mates or feeding territories and its enemies to protect itself.

FRIENDS AND RELATIVES

One of the few European dinosaurs found in Mongolia is the very well known *Iguanodon*, found all over Europe. Mongolia had its share of hadrosaurs too. There was *Saurolophus*, a 12m long dinosaur, with a ridge running up its nose, ending in a spike on the back of its head. Scientists think it may have had a nose-balloon of skin, just like the North American hadrosaurs.

***Homalocephale* shares its meal with a *Microceratops* herd. These two plant-eaters lived peacefully alongside each other 70 million years ago in Mongolia.**

There are still amazing animals living in Mongolia today. Above: Bactrian camels; right: the saiga, a kind of antelope.

LATEST FINDS

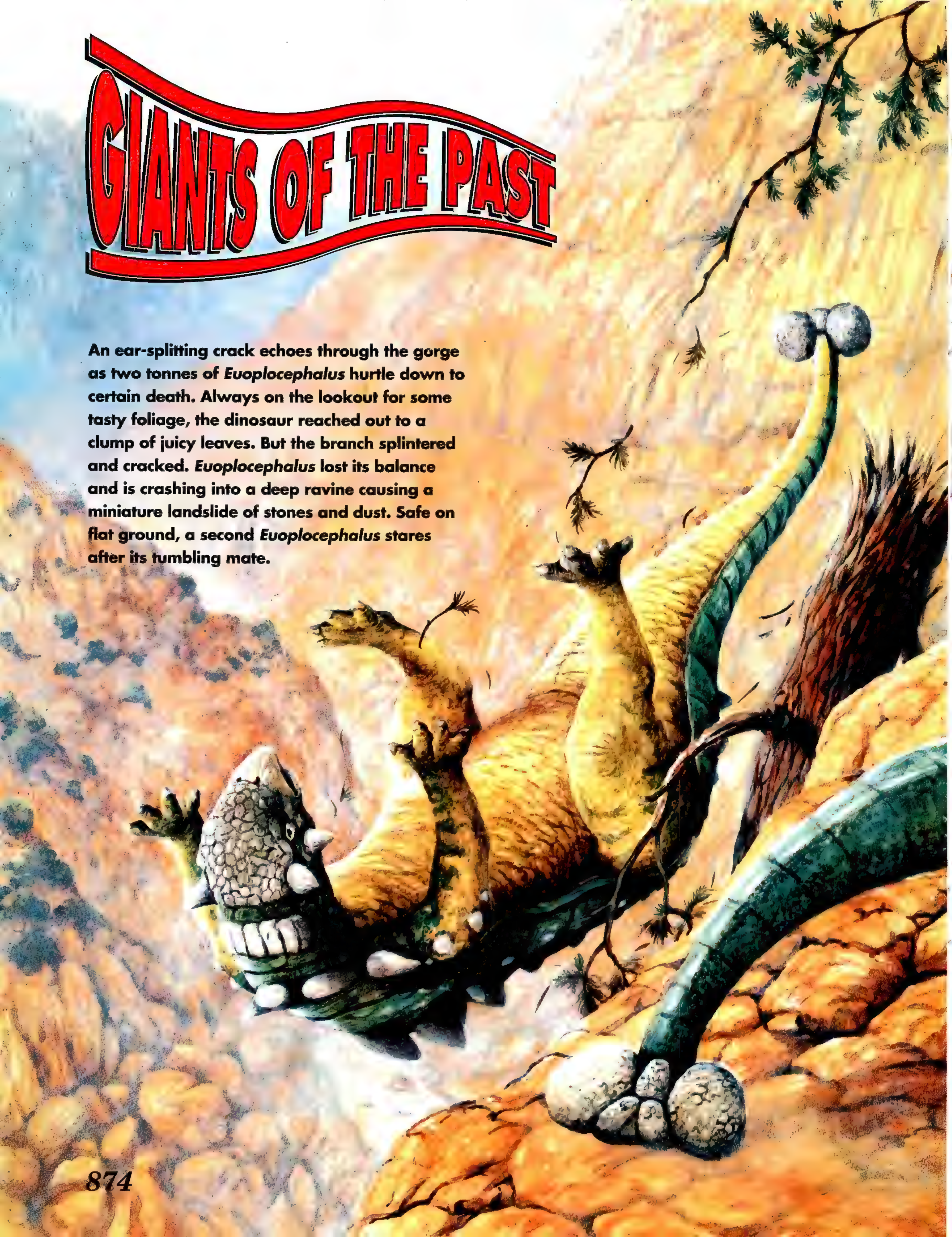
One of the most recent finds in Mongolia is a turkey-sized animal called *Mononychus*. It may be a dinosaur or a flightless bird, experts are uncertain. Scientists are still working on the fossil.

TO THE FUTURE

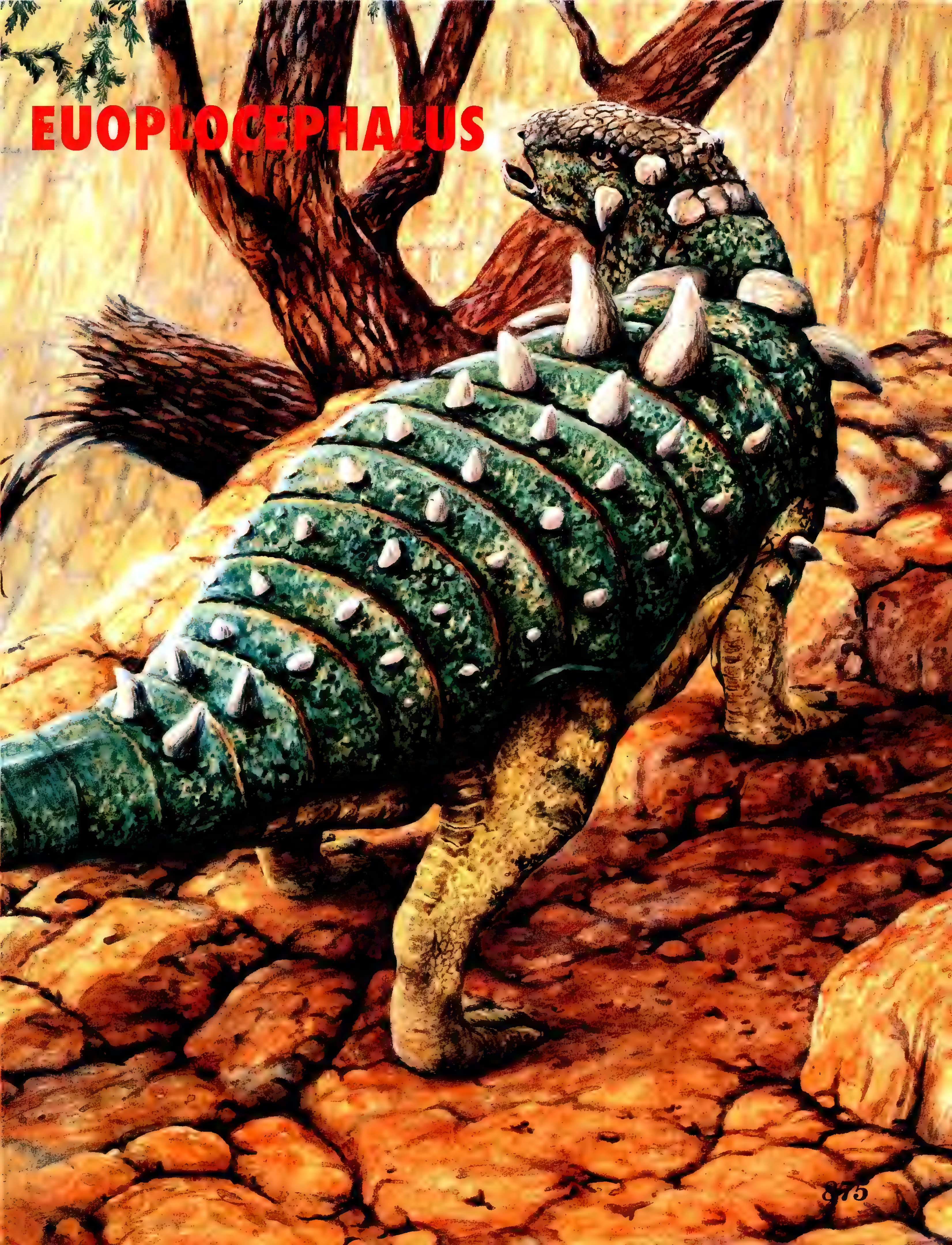
More fossil-hunting expeditions are planned to Mongolia. Doubtless there will be further exciting dinosaur discoveries in this remote land of mountains, plains and deserts.

GIANTS OF THE PAST

An ear-splitting crack echoes through the gorge as two tonnes of *Euoplocephalus* hurtle down to certain death. Always on the lookout for some tasty foliage, the dinosaur reached out to a clump of juicy leaves. But the branch splintered and cracked. *Euoplocephalus* lost its balance and is crashing into a deep ravine causing a miniature landslide of stones and dust. Safe on flat ground, a second *Euoplocephalus* stares after its tumbling mate.



EUOPLOCEPHALUS



3-D Gallery

IGUANODON V BECKLESPINAX

A ravenous *Becklespinax* tries to get his claws into what he hopes will be his next snack, a baby *Iguanodon*. But its spectacular spines do not manage to frighten away adult *Iguanodon* who rush to protect their baby. This time it looks as if *Becklespinax* is going to be defeated by *Iguanodon*.

Eggomania

What did dinosaur eggs look like, inside and out?

These fossilised Protoceratops eggs are 70 million years old!

One of the most exciting discoveries in palaeontology was the discovery of hundreds of *Protoceratops*' eggs in the Gobi desert, Mongolia, in 1922. Up till then no one knew for sure that dinosaurs laid eggs at all.

IN CIRCLES

The eggs were laid upright in circles. The female *Protoceratops* scraped shallow holes a metre wide in the sand and then turned round and round in a tight circle as each new egg was laid. Sand was pushed around the eggs to keep them upright, making it easy for the dinosaur to hatch out of the top.

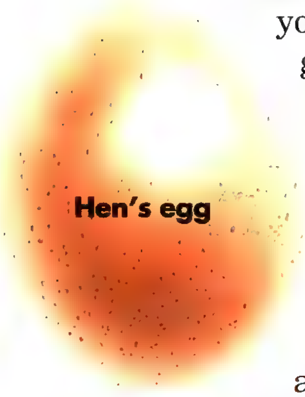
Life-size egg probably belonging to the giant sauropod *Hypselosaurus* (left). Look how small the hen's egg (right) is in comparison.

SMALL EGGS

Dinosaur eggs were not as big as you might think. Unlike a hen's egg which is about one eighth the size of an adult, a dinosaur egg could be as much as one hundredth the size of its mother. So why were the eggs so small? If the eggs were very large they would need a very thick shell to stop them from collapsing. But if the shell was too thick the embryo inside could not hatch because it was not strong enough to break the shell.

FULL OF GOODNESS

Until it grew big and strong enough to break out of its shell, the egg was the dinosaur's home. Just like a bird's egg the dinosaur egg contained yolk. The yolk provided the growing dinosaur with a rich and very nutritious liquid food.


Hen's egg

PROTECTING THE YOLK

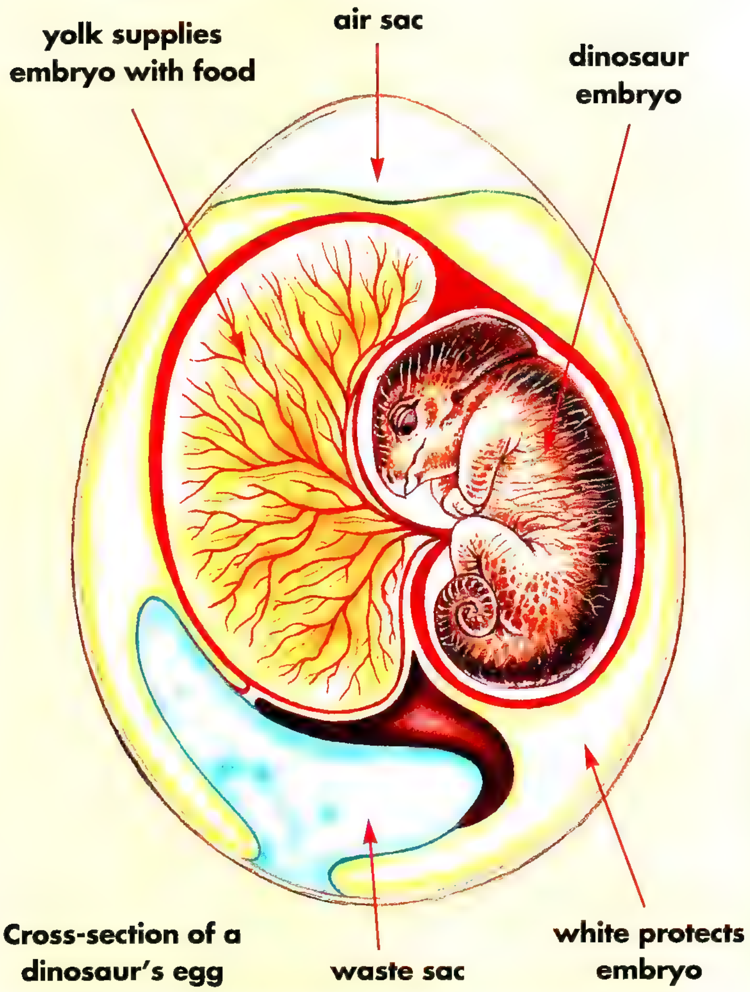
The white, otherwise known as albumen, cushioned the yolk. It was mostly made up of water. If the egg was jarred the albumen protected the embryo and the yolk from harm.

THIN MEMBRANES

Membranes (thin layers of skin) surrounded the albumen and on these the shell was formed. The membranes prevented many harmful bacteria from entering the egg, and damaging the embryo.

EGG TOOTH

Lizards, snakes, birds and crocodiles all have an egg tooth which forms when they are growing inside their shell. Dinosaur hatchlings may also have had an egg tooth. With its sharp tooth it would have cracked a hole in the shell and wriggled out.



Cross-section of a dinosaur's egg

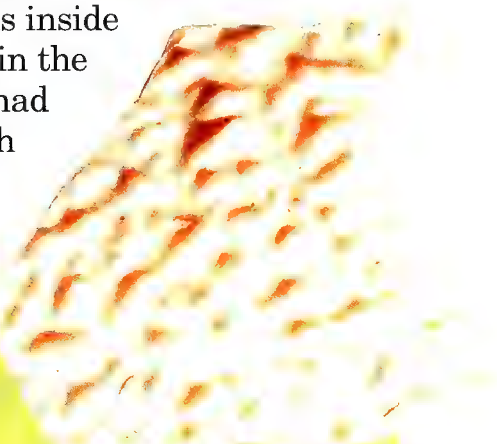
Hatching time! A baby *Protoceratops* struggles out of its shell.

AIR TUBES

The shell had many tiny tubes leading from inside the egg to the outside air. These allowed the embryo to breathe. The shell had to be thin enough to allow oxygen to enter the egg.

THIN BUT TOUGH

The hard shell protected the egg contents. It had to be tough enough to keep the important liquids inside from drying out in the sun. But it also had to be thin enough for the baby to break it when it hatched.



This is a fragment from a *Protoceratops'* shell. It shows the bumps and grooves which strengthened the shell and protected it from the weather.

Hot or Cold Blood?

Dinosaurs were reptiles. But were they cold-blooded like modern reptiles? Or warm-blooded like mammals and birds?

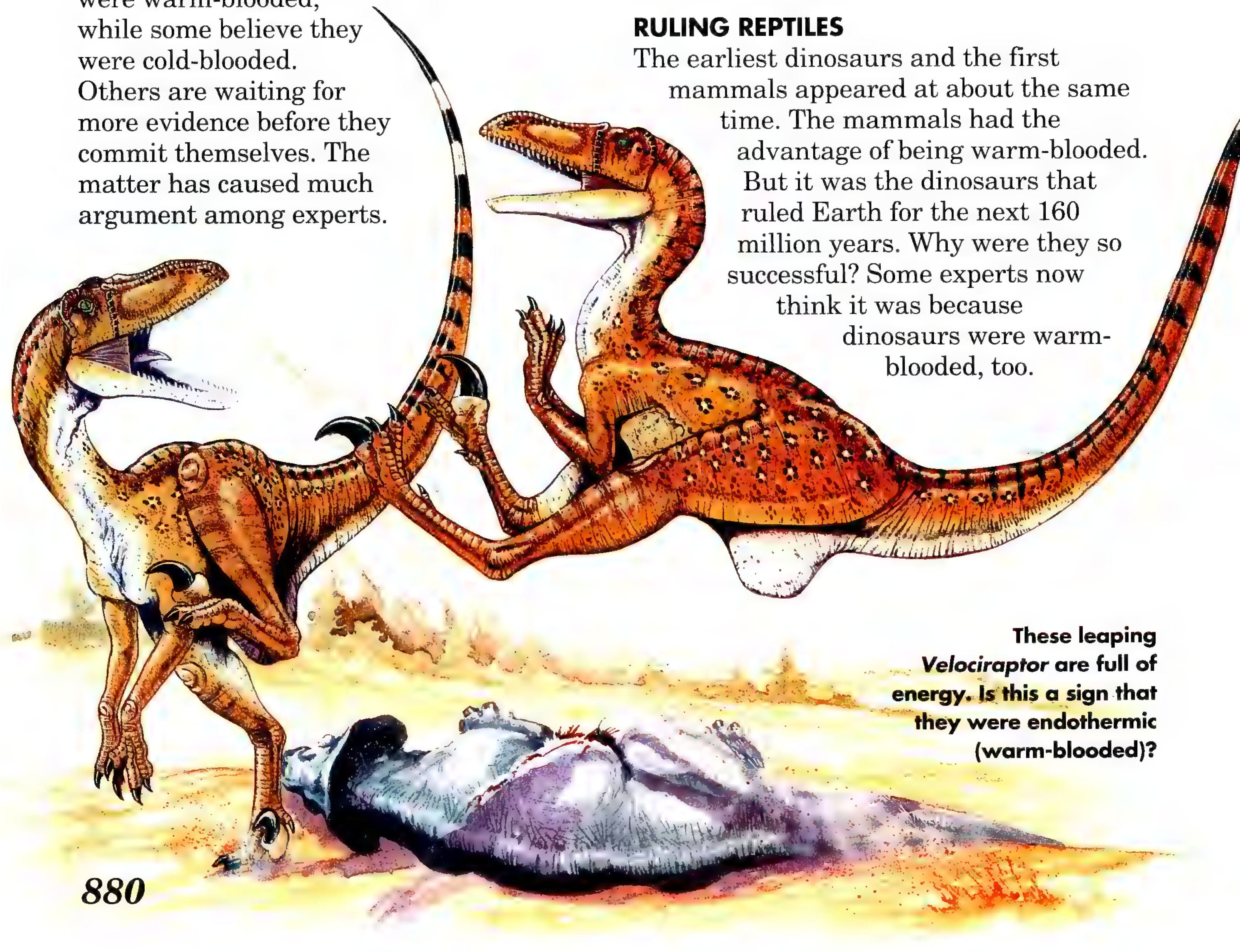
People used to think that dinosaurs were cold-blooded (ectothermic). But recently, some scientists have produced evidence which they say proves dinosaurs were warm-blooded (endothermic). Today, some scientists are sure that dinosaurs were warm-blooded, while some believe they were cold-blooded. Others are waiting for more evidence before they commit themselves. The matter has caused much argument among experts.

Is it true that warm-blooded animals make their own blood warm?

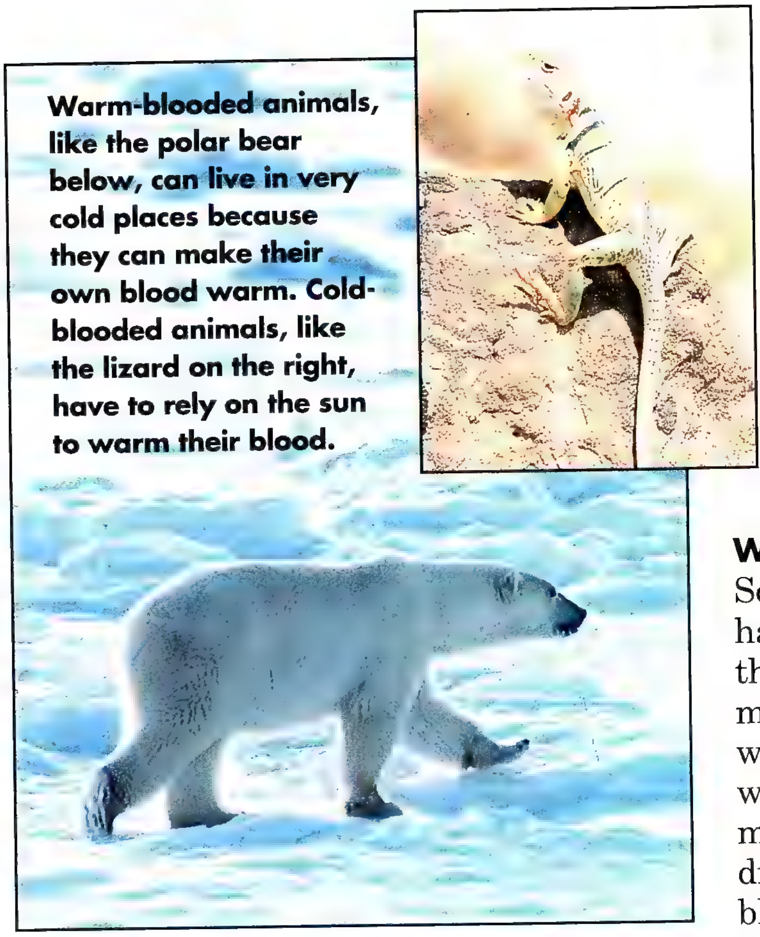
Yes. Through a complex process, endothermic (warm-blooded) animals, like mammals, can turn the food they eat into energy and that energy keeps the blood warm. No mammal can produce enough energy to be really active unless it is warm. If their blood gets too warm mammals have ingenious ways of cooling it: dogs pant and humans sweat.

RULING REPTILES

The earliest dinosaurs and the first mammals appeared at about the same time. The mammals had the advantage of being warm-blooded. But it was the dinosaurs that ruled Earth for the next 160 million years. Why were they so successful? Some experts now think it was because dinosaurs were warm-blooded, too.



These leaping *Velociraptor* are full of energy. Is this a sign that they were endothermic (warm-blooded)?



Warm-blooded animals, like the polar bear below, can live in very cold places because they can make their own blood warm. Cold-blooded animals, like the lizard on the right, have to rely on the sun to warm their blood.

FULL OF ENERGY

For years dinosaurs were thought to be massive, slow, plodding beasts. Today, a new picture of dinosaurs has emerged. Many experts agree that certain dinosaurs were extremely active and agile. The ostrich dinosaurs could run very fast. Some experts say that only warm-blooded animals have enough energy to move like that. Other experts disagree because certain modern reptiles can sprint along on two legs, and they are cold-blooded.

WARM AND IN CONTROL

The big advantage of being warm-blooded is that you are in control. Warm-blooded, or endothermic animals, such as mammals, can make their own heat by turning food into warmth. That means they can be active even when the air is cold. So they can hunt at night as well as during the day and live in freezing conditions.

WAITING TO GET WARM

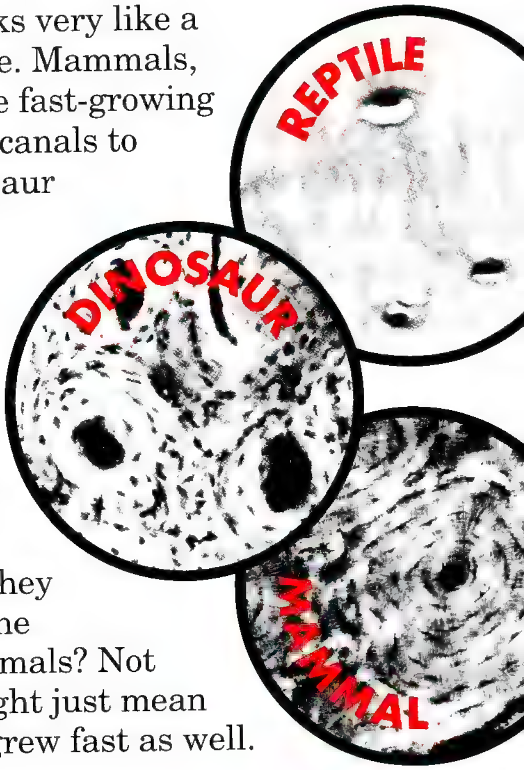
Cold-blooded animals, such as reptiles, cannot control their body temperatures. They need warmth to remain active. But they cannot make it themselves. After a cold night they have to bask in the sun until they are warmed through before they can go out hunting or feeding. So cold-blooded animals mainly live in warm climates.

WALKING TALL

Some experts argue that dinosaurs must have been endothermic because of the way they stood and ran. The legs of most modern reptiles sprawl out to the side when they move. But the dinosaurs' legs were straight under their bodies, like modern mammals and birds. Other experts disagree. They point out that not all cold-blooded reptiles have sprawling legs. Chameleons walk in an upright way.

BLOOD AND BONE

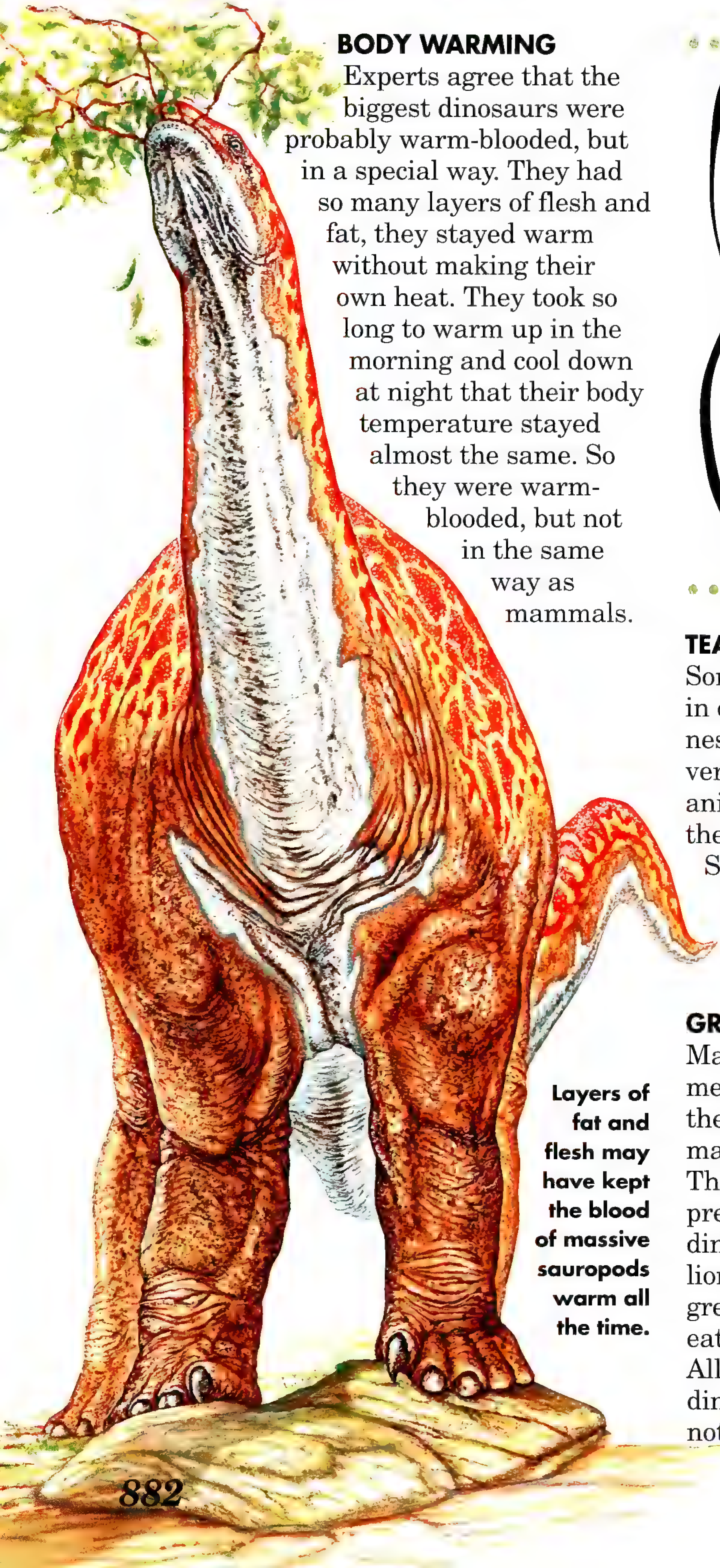
Under a microscope, a section of dinosaur bone looks very like a section of cow bone. Mammals, such as cows, have fast-growing bones with lots of canals to carry blood. Dinosaur bones are similar. Living reptiles have slow-growing bones. And they look very different under the microscope. Were dinosaurs warm-blooded because they have a similar bone structure to mammals? Not necessarily. It might just mean that their bones grew fast as well.



TIME DETECTIVE

BODY WARMING

Experts agree that the biggest dinosaurs were probably warm-blooded, but in a special way. They had so many layers of flesh and fat, they stayed warm without making their own heat. They took so long to warm up in the morning and cool down at night that their body temperature stayed almost the same. So they were warm-blooded, but not in the same way as mammals.



Layers of fat and flesh may have kept the blood of massive sauropods warm all the time.

IT'S A FACT

INTERNAL BOILERS

A few scientists think that extremely large sauropods like *Brachiosaurus* generated heat with their stomachs. They believe that as the animals' huge stomachs digested plants, the mixture fermented (turned to sugar and alcohol) and gave off heat. So large sauropods could always create heat through their stomachs and did not need to be endothermic.

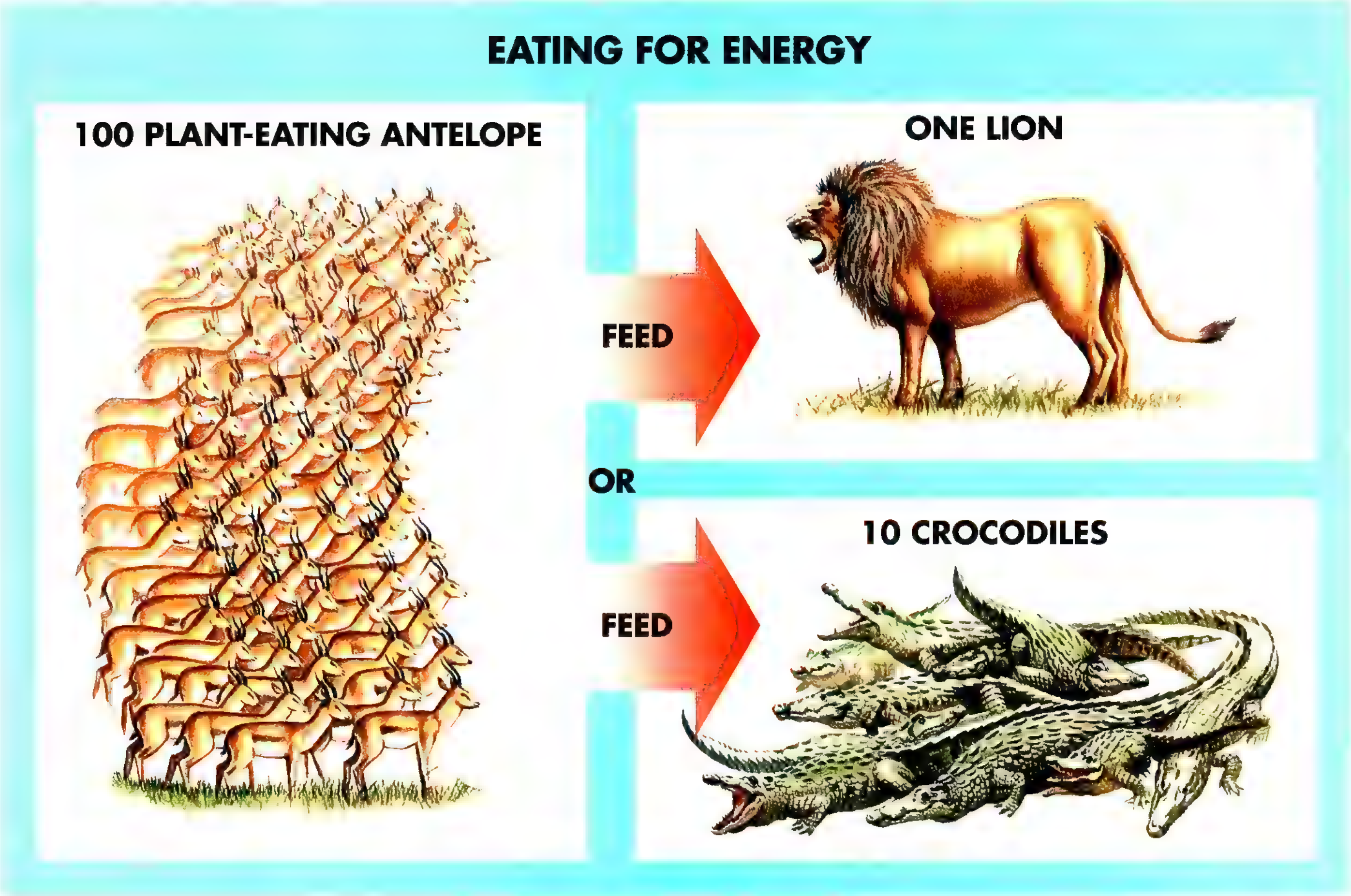
TEAM WORK

Some dinosaurs seem to have moved about in organised herds. Others created large nesting colonies. This sort of behaviour is very similar to that of many modern animals and birds. Could that be proof that the dinosaurs were warm-blooded?

Scientists agree that it is an interesting idea. But some point out that certain cold-blooded modern reptiles, such as crocodiles, live together too.

GREEDY MEAT-EATERS

Many more plant-eating dinosaurs than meat-eating dinosaurs have been found in the same place. Some experts believe they may be the fossils of killers and their prey. They argue that because there were less predators than prey, the meat-eating dinosaurs may have been like modern lions. A warm-blooded lion needs to eat a great deal of meat to keep up its energy. It eats far more than a cold-blooded crocodile. All this, say some experts, is proof that dinosaurs were warm-blooded like lions, not cold-blooded like crocodiles.



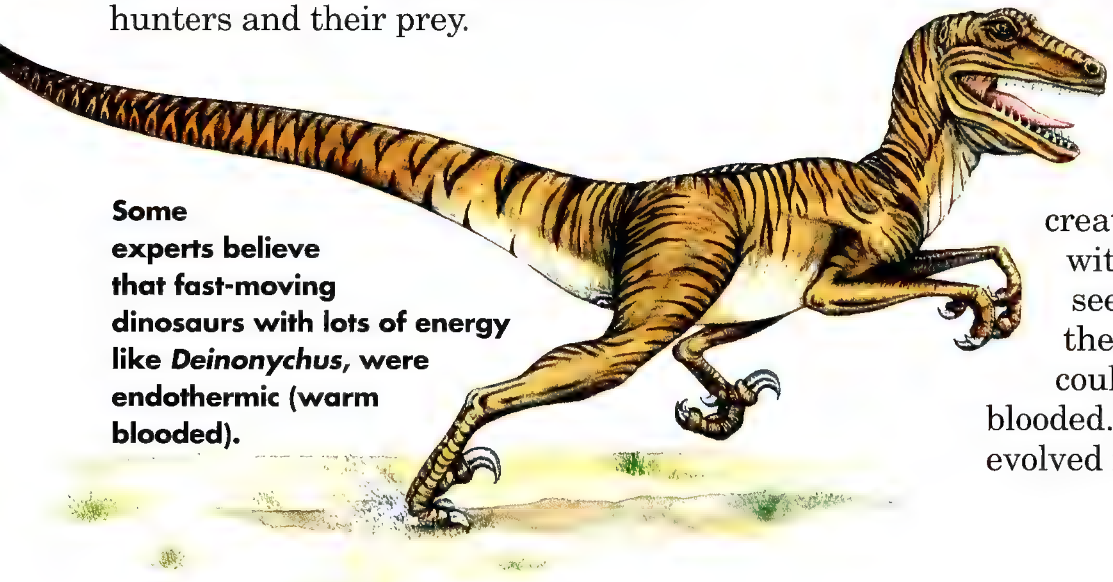
A lion needs to eat much more than a crocodile. The lion turns food into energy to keep its blood at the same temperature all the time. A cold-blooded crocodile can eat less. So 100 antelope will feed 10 crocodiles but only one lion.

DISAGREEMENTS

However, other palaeontologists do not agree that finding more plant-eaters than meat-eaters in the same place proves that dinosaurs may have been warm-blooded. These experts say that there is no proof that the plant-eating and meat-eating dinosaurs discovered together also lived side by side. So they might not be the hunters and their prey.

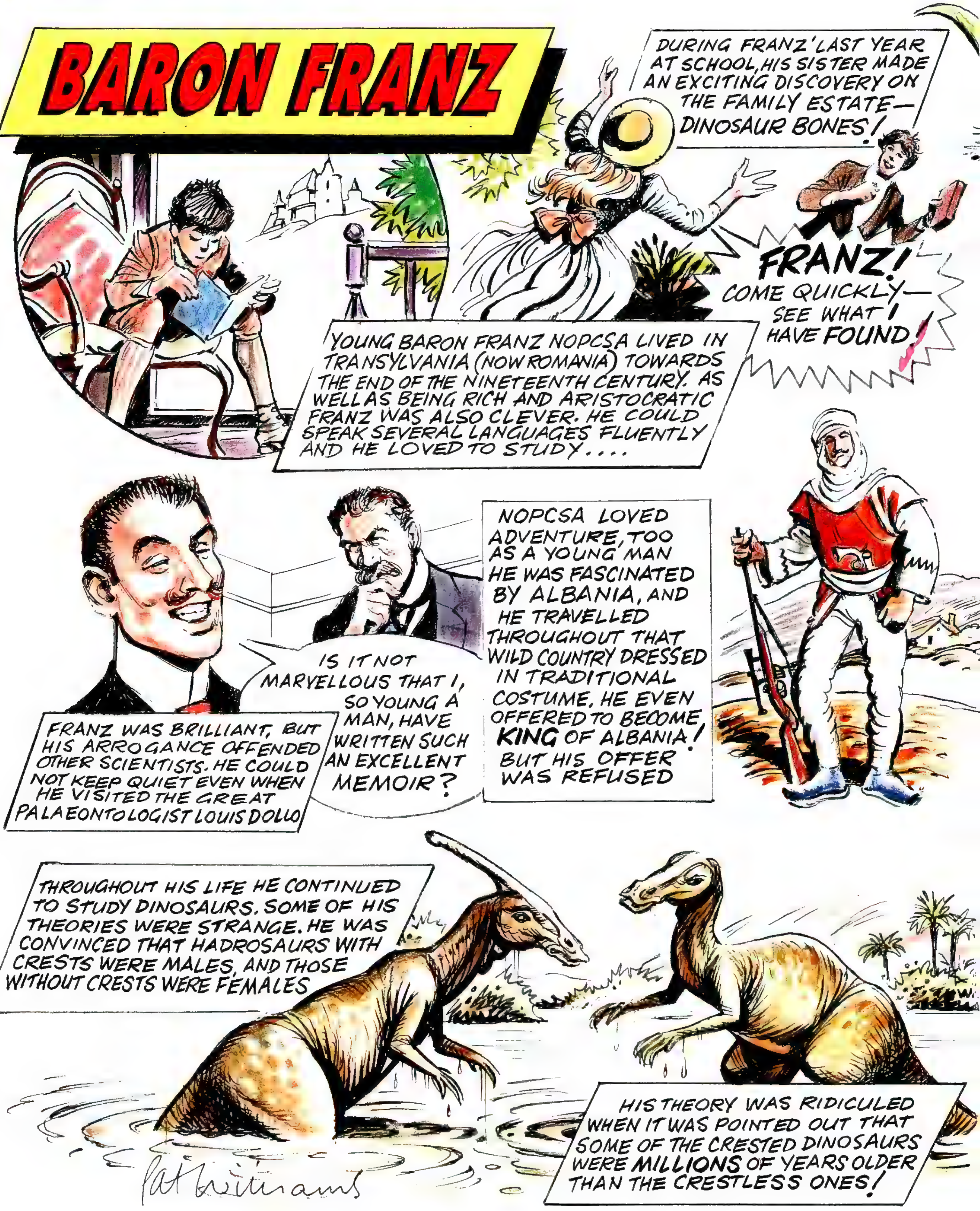
WHO IS RIGHT?

Nobody knows for certain if dinosaurs were warm-blooded or cold-blooded. But the arguments for and against have helped to change the way we look at them. Scientists now agree that dinosaurs were not lumbering creatures. Many were quick-witted and fast-moving. It seems likely that some of the small, active hunters could have been warm-blooded. They could have evolved into today's birds.



Some experts believe that fast-moving dinosaurs with lots of energy like *Deinonychus*, were endothermic (warm blooded).

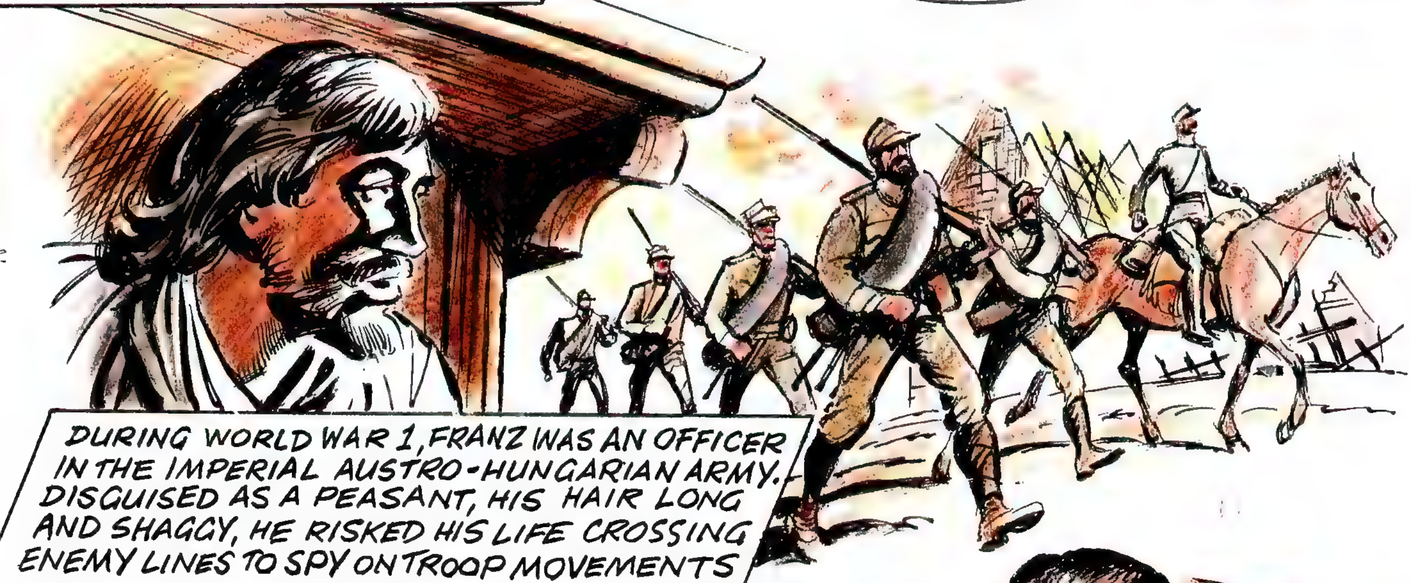
BARON FRANZ


YOUNG BARON FRANZ NOPCSA LIVED IN TRANSYLVANIA (NOW ROMANIA) TOWARDS THE END OF THE NINETEENTH CENTURY. AS WELL AS BEING RICH AND ARISTOCRATIC FRANZ WAS ALSO CLEVER. HE COULD SPEAK SEVERAL LANGUAGES FLUENTLY AND HE LOVED TO STUDY....
DURING FRANZ' LAST YEAR AT SCHOOL, HIS SISTER MADE AN EXCITING DISCOVERY ON THE FAMILY ESTATE— DINOSAUR BONES!
FRANZ! COME QUICKLY— SEE WHAT I HAVE FOUND!
FRANZ WAS BRILLIANT, BUT HIS ARROGANCE OFFENDED OTHER SCIENTISTS. HE COULD NOT KEEP QUIET EVEN WHEN HE VISITED THE GREAT PALAEONTOLOGIST LOUIS DOLLO
IS IT NOT MARVELLOUS THAT I, SO YOUNG A MAN, HAVE WRITTEN SUCH AN EXCELLENT MEMOIR?
NOPCSA LOVED ADVENTURE, TOO AS A YOUNG MAN HE WAS FASCINATED BY ALBANIA, AND HE TRAVELLED THROUGHOUT THAT WILD COUNTRY DRESSED IN TRADITIONAL COSTUME, HE EVEN OFFERED TO BECOME KING OF ALBANIA! BUT HIS OFFER WAS REFUSED
THROUGHOUT HIS LIFE HE CONTINUED TO STUDY DINOSAURS. SOME OF HIS THEORIES WERE STRANGE. HE WAS CONVINCED THAT HADROSAURS WITH CRESTS WERE MALES, AND THOSE WITHOUT CRESTS WERE FEMALES
HIS THEORY WAS RIDICULED WHEN IT WAS POINTED OUT THAT SOME OF THE CRESTED DINOSAURS WERE MILLIONS OF YEARS OLDER THAN THE CRESTLESS ONES!
Pat Williams

THE FOSSIL WAS A NEW DINOSAUR NAMED TELMATOSAURUS; ITS DISCOVERY CAPTURED FRANZ' IMAGINATION AND HE BECAME AVIDLY INTERESTED IN DINOSAURS

WHEN HE LEFT SCHOOL HE WENT TO THE UNIVERSITY OF VIENNA. THERE HE WROTE AN IMPRESSIVE AND SCHOLARLY ACCOUNT OF THE DINOSAUR HIS SISTER HAD DISCOVERED. EXPERTS HAILED IT AS A MODEL OF SCIENTIFIC RESEARCH

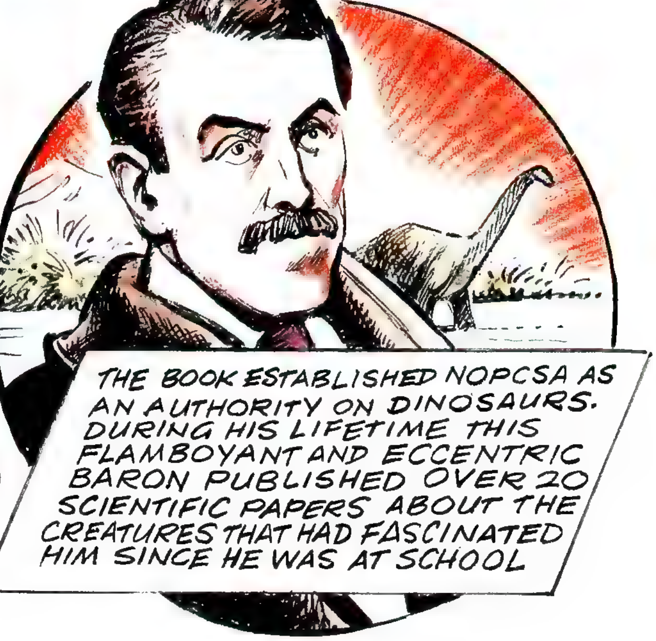
THIS WILL MAKE MY REPUTATION!



DURING WORLD WAR 1, FRANZ WAS AN OFFICER IN THE IMPERIAL AUSTRO-HUNGARIAN ARMY. DISGUISED AS A PEASANT, HIS HAIR LONG AND SHAGGY, HE RISKED HIS LIFE CROSSING ENEMY LINES TO SPY ON TROOP MOVEMENTS

HOWEVER, NOPCSA'S GREATEST CONTRIBUTION TO SCIENCE WAS HIS WORK ON THE CLASSIFICATION OF DINOSAURS. IN 1923 HE PUBLISHED A BOOK IN WHICH HE BUILT ON THE WORK OF THE GERMAN PALAEONTOLOGIST VON HUENE, WHICH DIVIDED DINOSAURS INTO TWO MAIN GROUPS ....

VON HUENE WAS RIGHT! DINOSAURS HAVE TWO DIFFERENT KINDS OF HIP BONES AND SHOULD THEREFORE BE PLACED IN TWO SEPARATE GROUPS!



THE BOOK ESTABLISHED NOPCSA AS AN AUTHORITY ON DINOSAURS. DURING HIS LIFETIME THIS FLAMBOYANT AND ECCENTRIC BARON PUBLISHED OVER 20 SCIENTIFIC PAPERS ABOUT THE CREATURES THAT HAD FASCINATED HIM SINCE HE WAS AT SCHOOL

Improve and test your knowledge with...

DinoFile Fact File

Climb down *Diplodocus*' neck answering the questions as you go.

3 *Pisanosaurus* was as big as:
a) an elephant
b) a human
c) a chicken

4 What sort of dinosaur was *Bactrosaurus*?
a) a hadrosaur
b) a sauropod
c) an ankylosaur

5 What was *Euoplocephalus* covered with?
a) feathers
b) fur
c) plates and studs

6 When were the first dinosaur eggs discovered?
a) 1822
b) 1922
c) 1992

7 When did Mongolian dinosaurs live?
a) in the Triassic
b) in the Jurassic
c) in the Cretaceous

8 Baron Franz Nopcsa classified dinosaurs into:
a) 2 groups
b) 3 groups
c) 6 groups

9 What makes cold-blooded animals warm?
a) food
b) sunshine
c) exercise

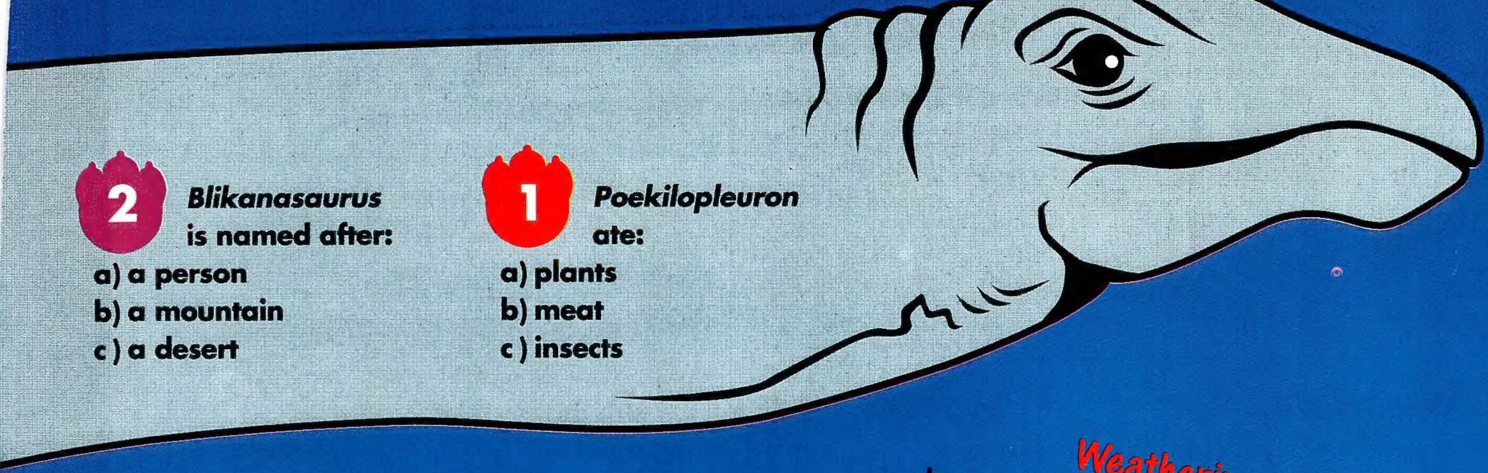
10 *Tarbosaurus* was similar to which American dinosaur?
a) *Triceratops*
b) *Edmontosaurus*
c) *T rex*

A world of giants

Dinosaurs were not the only huge living things that lived during the Jurassic Period. Giant 100m trees towered over the landscape, oversized dragonflies and cockroaches buzzed through the air and giant sea-creatures ruled the waves.

Inspiration

Michael Crichton, author of the best-selling book 'Jurassic Park', based the character of Dr Alan Grant on the American palaeontologist, Jack Horner. Horner is famous for the discovery of dinosaur nests and eggs at Egg Mountain, in Montana, USA.



2 ***Blikanasaurus*** **is named after:**
- a) a person
- b) a mountain
- c) a desert

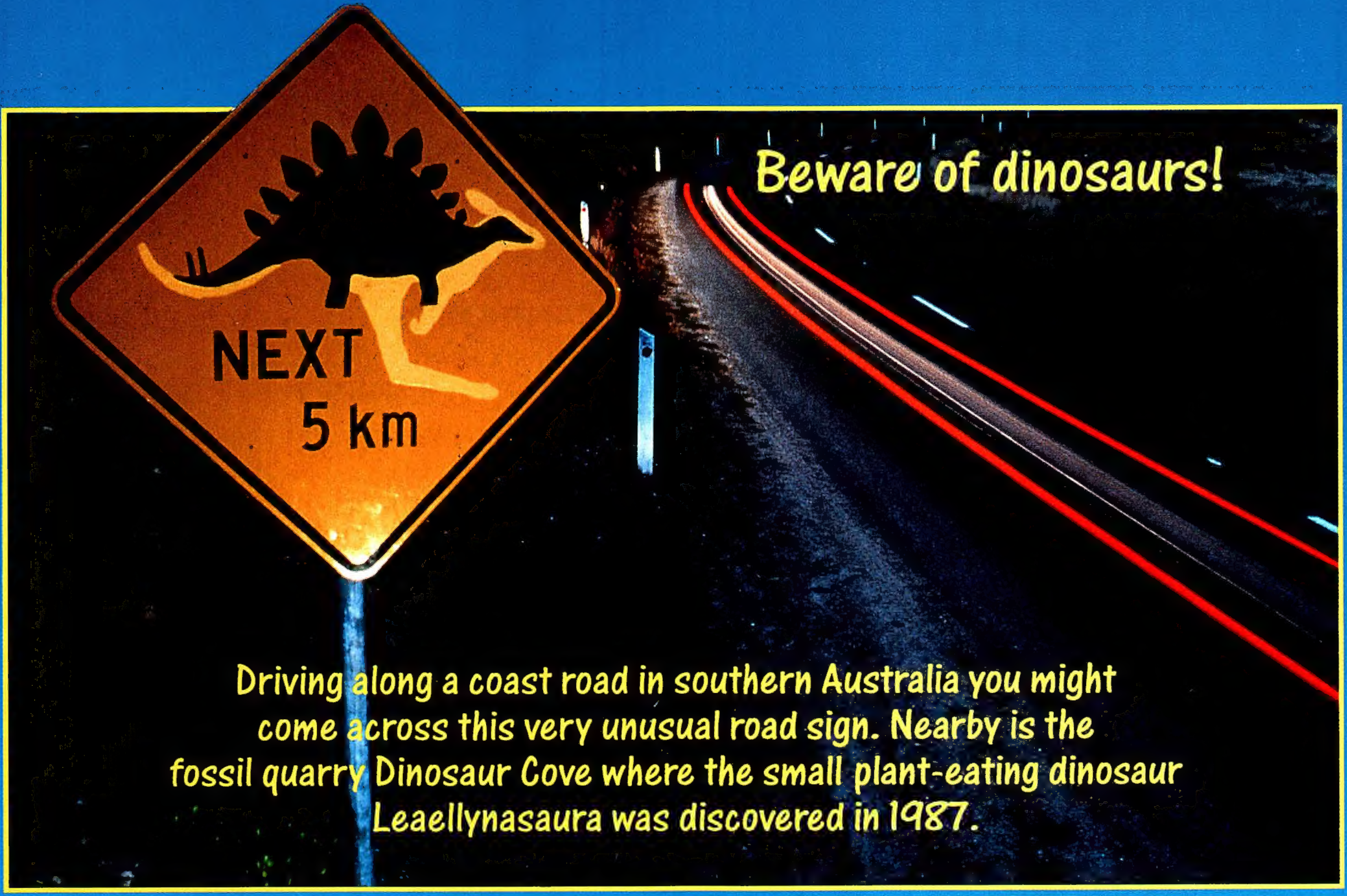
1 ***Poekilopleuron*** **ate:**
- a) plants
- b) meat
- c) insects

Useful neck

The huge sauropod Mamenchisaurus had an 11m long neck. The neck was not only very useful for reaching juicy leaves from the tops of the tall trees, but it also meant the dinosaur could plunge into water to sweep out tasty water plants.

Weathering away

In a limestone ledge nicknamed Cam Bench at Como Bluff, Wyoming, USA, part of a Camarasaurus skeleton has been left exposed. It would take scientists weeks of hard work to dig it out of the rock. Because it is only a small part of the fossil it has been left to the wind and rain.

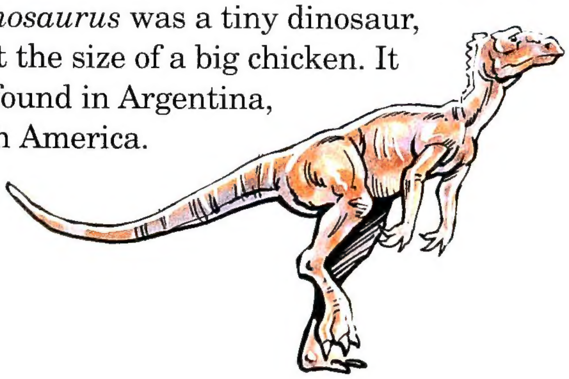


Beware of dinosaurs!

Driving along a coast road in southern Australia you might come across this very unusual road sign. Nearby is the fossil quarry Dinosaur Cove where the small plant-eating dinosaur Leaellynasaura was discovered in 1987.

PISANOSAURUS 210 MYA

Some experts claim that *Pisanosaurus* (pi-zan-o-saw-rus) was the earliest ornithopod, but this is not known for certain. Only pieces of its backbone, jaw, leg and foot have been found so it is difficult to be sure. *Pisanosaurus* was a tiny dinosaur, about the size of a big chicken. It was found in Argentina, South America.

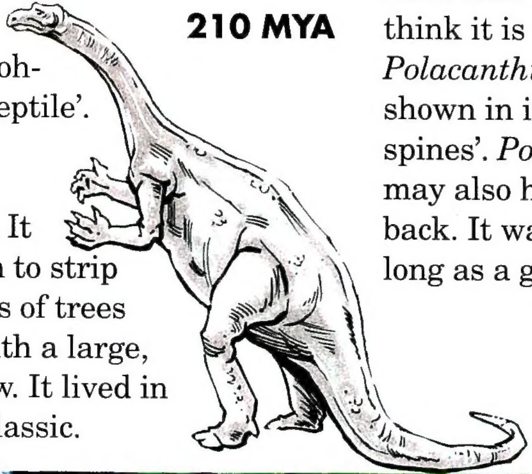


PIVETEAUSAURUS 170 MYA

Piveteausaurus (piv-et-oh-saw-rus) was a meat-eater. It was possibly longer than a bus and heavier than a rhinoceros. One scientist believes the fossil belongs to a dinosaur the size of a male chimpanzee. *Piveteausaurus* means Piveteau's reptile. It was named after the French scientist Piveteau. It lived in the Mid Jurassic Period in northern France.

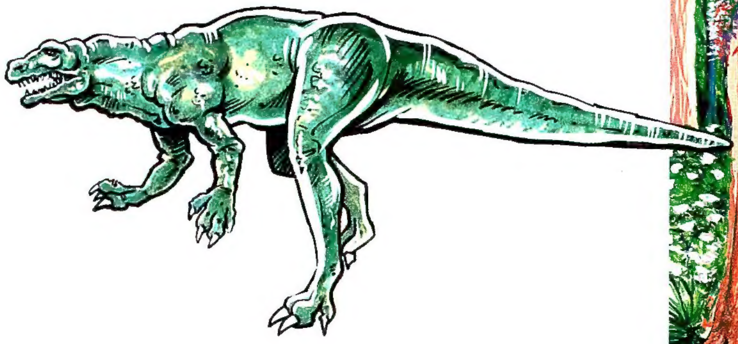
PLATEOSAURUS 210 MYA

Plateosaurus (plat-ee-oh-saw-rus) means 'flat reptile'. As long as a coach, *Plateosaurus* was the first large plant-eater. It used leaf-shaped teeth to strip branches from the tops of trees and protected itself with a large, scythe-like thumb claw. It lived in Europe in the Late Triassic.



POEKILOPLEURON 160 MYA

A ferocious meat-eater, the theropod *Poekilopleuron* (po-ki-loh-plur-on) was about as long as three rhinoceroses. Its fossil was discovered in a limestone quarry near the town of Caen in northern France. *Poekilopleuron* lived in the Mid Jurassic Period. It was about 9m long and strode around on two powerful legs. It had very strong short arms and five-fingered hands. Its name means 'varying cavity'.



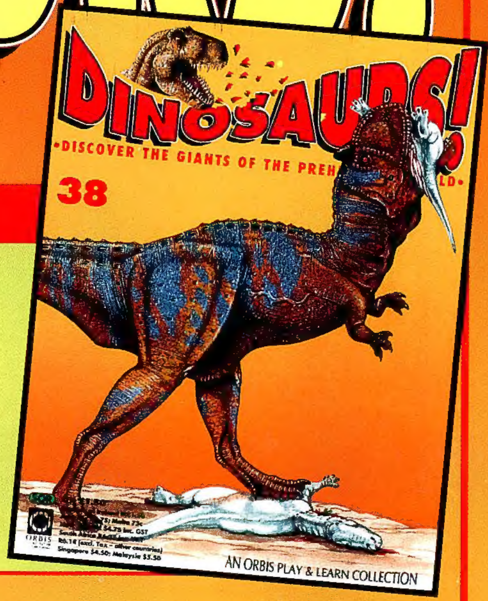
POLACANTHOIDES 100 MYA

Not much is known about this plant-eater from the Early Cretaceous Period. Some of its fossils, including its unusual shoulder blade, have been found in the Isle of Wight. Experts think it is very like the armoured dinosaur, *Polacanthus*. Its similarity to *Polacanthus* is shown in its name, which means 'like many spines'. *Polacanthoides* (pole-a-can-thoy-deez) may also have had a fringe of spines along its back. It walked on four legs and was about as long as a giraffe is tall!

MYA = MILLION YEARS AGO

COMING IN PART 38 OF

DINOSAURS!


DINOSAURS!
•DISCOVER THE GIANTS OF THE PREHISTORIC WORLD•
38
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Meet the dinosaurs that lived in South America in DINO WORLD.
Read some loony theories on dinosaur extinction in TIME DETECTIVE.

PLUS

IDENTIKIT investigates the lives of three more exciting dinosaurs
and
SPOTTER'S GUIDE
GIANTS OF THE PAST
3-D GALLERY

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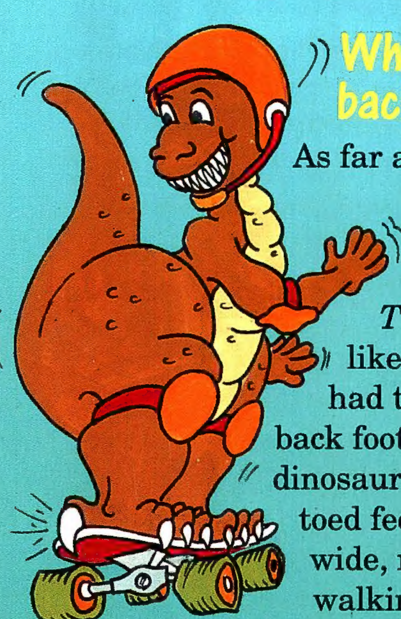
THE DINOSAURS! POSTER COLLECTION

Have you ever wanted to fill your room with dinosaurs? Now you have your chance – with the *Dinosaurs!* POSTER COLLECTION. Each poster is a 820 x 570mm (nearly eight times the size of this page) and features a superb dinosaur artwork. You'll find facts and figures about the dinosaur on the back – PLUS a look at some other prehistoric animals. The eleventh poster is *Spinosaurus*.

ANSWERS TO DINO FACT FILE QUESTIONS: 1.b 2.b 3.c 4.a 5.c 6.b 7.c 8.a 9.b 10.c

Dr. David Norman of Cambridge University answers your dinosaur questions

ASK THE EXPERT



What was T rex' back claw for?

As far as we know, the back claw on the hind foot of *T rex* was not used for anything special. *T rex* walked on two legs like many dinosaurs and had three large toes on its back foot. The very earliest dinosaurs probably had five-toed feet which were rather wide, making running and walking a bit awkward.

It is possible that over millions of years some dinosaurs' feet evolved so their outside toes (our big and little toes) became smaller, making their feet narrower. So the back claw of *T rex* is a leftover of an outer toe.

Did any dinosaur eat both meat and plants like humans do?

Very few dinosaurs were able to eat both meat and plants. The most likely omnivores are thought to be the ornithomimosaurs - the bird-mimic dinosaurs (*Ornithomimus, Dromiceiomimus, Gallimimus*). These have ostrich-like features and their diet may have included some of the things ostriches eat such as small animals, insects, fruits, leaves and shoots. So far we have no evidence from fossilized stomach contents to prove this, but we can make good guesses by looking at modern animals such as ostriches.

What was the biggest dinosaur expedition?

The great American expedition to Central Asia in the 1920s led by Roy Chapman Andrews was probably the biggest and most demanding expedition ever organised. Fleets of vehicles transported huge amounts of food, fuel and equipment across Asia. Then large numbers of camels were used to carry fuel deep into the Asian interior (China and Mongolia) so that vehicles could be re-fuelled on the way.

Were any feathered birds around in the Age of the Dinosaurs?

Yes, there were! One of the earliest bird fossils, *Archaeopteryx* (its name means 'ancient wing') was found in the 1860s. It lived in Late Jurassic times alongside dinosaurs such as *Diplodocus*. Impressions of feathers were found by the skeleton, proof that it was a bird. Some other bird fossils from Cretaceous times have also been found.

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